THE GEOGRAPHICAL JOURNAL

VOLUME XCIV

JULY TO DECEMBER

1939

PUBLISHED UNDER THE AUTHORITY OF THE COUNCIL

EDITED BY THE SECRETARY

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EXPLORATION IN THE LESSER SUNDA ISLANDS

H. A. BROUWER

Evening Meeting of the Society, 14 November 1938

RESEARCH in the East Indian archipelago has proved to be illuminating with regard to the growth of folded mountain ranges. The archipelago is located at the intersection of two great zones of crustal weakness of the earth. In its eastern part the mountain-building processes are still active, while the portion to the west of Makassar Strait has long been more or less stable, except where it borders upon the Indian Ocean. Another stable area is found to the south-east of the archipelago in Australia with its continental shelf.

An outline of this field of geological research was given in 1925.[1] Much of the later literature about the tectonic evolution of the unstable part of the archipelago was not based on new geological observations but on the results obtained by other methods of exploration, namely, the mapping of the earth relief under the seas and the measurements of gravity. The first bathymetrical chart of the archipelago was published in 1903 by Tydeman,[2] the naval chief of the *Siboga* expedition (1899–1900). A great increase in the number of soundings was made by the *Snellius* expedition (1929–30), which employed the echo-sounding method and added extremely valuable detail to our knowledge of the submarine topography, demonstrating a more complicated arrangement of the deep basins and submarine ridges. The bathymetrical charts were published in 1935 by van Riel,[3] the leader of the expedition; their geological interpretation was discussed by Kuenen.[4] Measurements of gravity at sea were made during voyages in submarines by Vening Meinesz.[5] Most of

[1] H. A. Brouwer, 'Geology of the Netherlands East Indies,' New York, 1925.

[2] G. F. Tydeman, 'Hydrographic results of the *Siboga* expedition.' *Siboga* Expeditie, Monograph III, Leiden, 1903.

[3] P. M. van Riel, 'Soundings and bathymetrical charts.' The *Snellius* Expedition, vol. 2, part 2 (Utrecht, 1934).

[4] Ph. H. Kuenen, 'Geological interpretation of bathymetrical results.' The *Snellius* expedition, vol. 5, part 1, 1935.

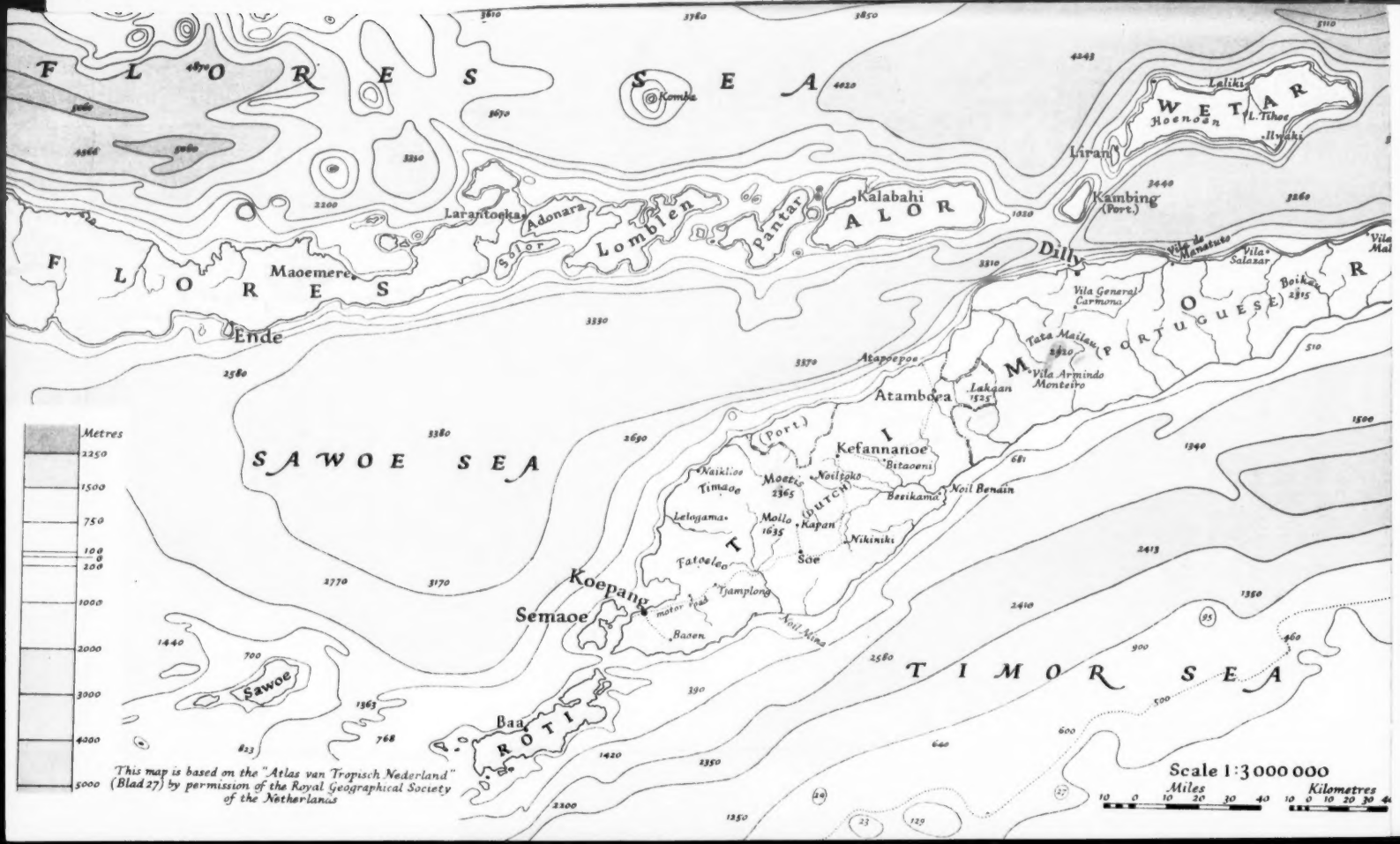
[5] F. A. Vening Meinesz, 'Gravity expeditions at sea,' vols. 1 and 2 (Delft, 1932, 1934).

his observations in the East Indies were made in 1929 and 1930; the results were published in 1932 and 1934, together with articles on the relation to geology by Umbgrove and on the relation to morphology by Kuenen. Secrets hidden by the sea have been revealed and knowledge of the earth's crust beneath the surface has been obtained; but the light thrown upon the tectonic evolution of the region by the bathymetrical charts and the measurements of gravity should not be overestimated. Although the soundings and gravity determinations were made upon a carefully considered scheme, there is still much uncertainty about the contours of the maps. Certain conclusions about the latest evolution can be derived from them, but, unlike geological observations, they do not give information about older stages through which the earth's crust has passed.

Geological research in the curving rows of islands of the south-eastern Malay archipelago is full of promise. In 1937 collaborative researches were made under my leadership by a group of ten geologists, including advanced students of the University of Amsterdam, on several of the Lesser Sunda islands. Scientific and educational purposes were combined, because eight of the participants did field work which will be discussed in their doctoral theses. The organization of this undertaking was facilitated by the fact that Mr. F. A. H. W. de Marez Oyens and myself had already worked in the region in 1910–12, partly as members of the expedition of Professor Molengraaff.

Fig. 1

The area studied is shown in Fig. 1. In the northern of the two rows of islands near Australia it includes Wetar, Lirang, Alor, Lomblen (with the volcanic island Batoe Tara, or Komba, to the north of it), Adonara, Solor, and the eastern part of Flores, while detailed investigations of critical parts were made in Netherlands Timor, which is the largest island of the southern row. The island had been partly explored by former expeditions, but the detailed structure was not sufficiently well known to provide positive evidence for the tectonic history of the region. The dry season (June–November) was chosen for our investigations, because we expected the more important results would come from studying the sections in the deep valleys, which would not be accessible for continuous work during the rains. The dry season also makes easier the transport of materials, provisions, and collections. We could use motor roads on Timor and Flores for establishing depots along the road and for transporting our collections to the coast. As soon as these roads are left, and on the other islands, transport is still as it used to be twenty-five years ago. On Timor we could make ample use of small native horses.


FLORES SEA
Komba
WETAR
Hoenoan
L. Tihoe
Ilwaki
Laliki
Liran
Kambing (Port.)
ALOR
Kalabahi
Pantar
Lomblen
Adonara
Solor
Larantoeka
FLORES
Maoemere
Ende
Dilly
Vila de Manatuto
Vila Salazar
Vila General Carmona
Tata Mailau 2880
Vila Armindo Monteiro
(PORTUGUESE)
TIMOR
Atapoepoe
Lakaan 1525
Atamboea
Kefannanoe
(Port.)
Bitaoeni
Naiklioe
Timaoe
Moetis 2365
Noiltoko
(DUTCH)
Besikama
Noil Benain
Lelogama
Mollo 1635
Kapan
Nikiniki
Soe
TIMOR
Fatoela
Tjamplong
Koepang
motor road
Semaoe
Basen
Noil Mina
Sawoe
Baa
ROTI
SAWOE SEA
TIMOR SEA
Metres
2250
1500
750
100
0
200
1000
2000
3000
4000
5000
This map is based on the "Atlas van Tropisch Nederland" (Blad 27) by permission of the Royal Geographical Society of the Netherlands
Scale 1:3 000 000
Miles
Kilometres

Through the courtesy of the government officials our work was much facilitated, and the natives were very willing to provide the labour which we needed. On Timor they could also be used as fossil hunters, and many a beautiful specimen has been obtained by purchase. But a disadvantage of encouraging search for fossils by the natives is that the material has no stratigraphical value; one can never be sure where the specimen has been collected, and our own search was sometimes handicapped by the fact that the localities had already been exhausted by the natives. We found the best method was to have children collecting under personal supervision in the different localities. They have a good eye for what is wanted and are keen on the work if they are rewarded for their trouble with a few copper coins.

The original habit of the natives on some of the islands, of building their houses on the top of steep mountains, dates from the time when they were head-hunters. It has been gradually disappearing since this pastime was prohibited, and the Government now obliges the population to build their villages near the main roads. But the old custom of long-distance speaking, which was necessary for communication between their homesteads on the mountain tops, is still preserved, and the native cry for attention and the order or question which follows are still often heard. Native dances are different in the different districts, but they have in common a very monotonous music; the dancing mostly ceases only at daybreak.

The topographical basis for our work consisted of various sketch-maps published by the Topographical Service at Batavia. Some of them are still very incomplete, and much topographical work had to be done during our expedition. This was made possible by the courtesy of the Government of the Netherlands East Indies. Several native topographers were put at our disposal by the Topographical Service and the Mining Department, and we were also allowed to use the still unpublished part of the 1/100,000 map of Timor.

Morphological features of the islands

The islands are arranged in two rows alternating with deep elongated sea basins. The topography of the northern row is primarily of volcanic origin. In those parts where no active or recently extinct volcanoes are found, volcanic rocks which are the products of an older period of volcanicity cover vast areas. They often present a rugged appearance, in contrast to the many beautiful cones in the regions where volcanism is still active, or was so until recent times. From Flores in the west to Wetar in the east one proceeds to regions where volcanoes gradually became extinct at an earlier period.

The islands of the southern row however are now entirely devoid of active volcanoes, but among the numerous volcanic rocks of different age in Timor there are found near the north coast some of Upper Tertiary age. The morphological features of these younger volcanic rocks resemble those of the island of Wetar in many respects.

The greater part of Timor consists of older sedimentary rocks with a very complicated structure. The deep valleys show evidence of strong erosion. A young central basin stretches in the direction of the longer axis of Netherlands Timor. Another conspicuous feature in the topography is formed by the steep isolated rock masses, called *fatus* by the natives, which mostly consist

of coral limestones of Upper Triassic age, though they also occur of Permian age. Remnants of old valleys, seen as depressions in hard rocks which have resisted erosion, give proof of older rivers which now have disappeared.

Terraces of upheaved coral reefs and other young sediments are found in both rows. They partly cover terraces of an older cycle of erosion. They reach heights of well over 1000 metres, decreasing east and west from the centre of Timor in the southern row and from the islands of Alor and Wetar in the northern row. As the coral reefs cannot grow in the presence of active volcanoes, they are most abundant in the southern row and in those parts of the northern row where volcanism was extinct at an early date.

In both rows of islands the crust is strongly fractured. Coast-lines and

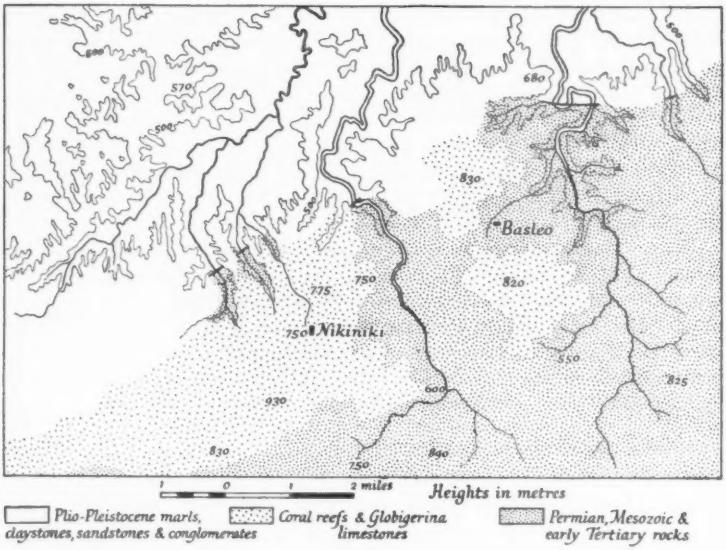
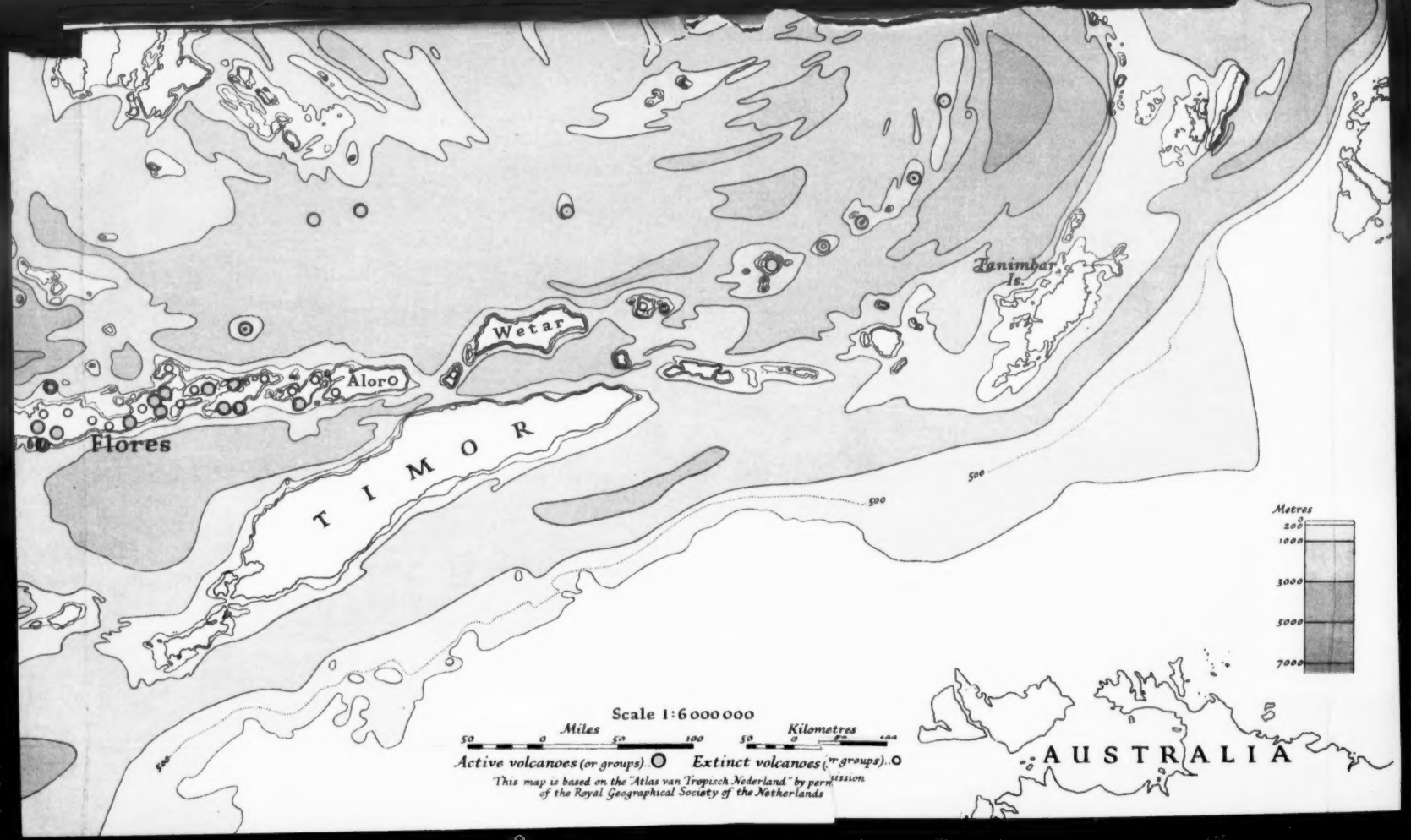


Fig. 2

basins are frequently bound by longitudinal, transverse, or diagonal fractures, which are connected with the strong recent movements of the crust.

Geological composition and structure

With regard to the different rock types found in the two rows of islands, there is a strong contrast between the southern and the northern row. On Timor the younger volcanics only cover small parts of the underlying rocks, while in the northern row the latter seem to be completely hidden by the volcanics, and erosion has not yet been able to cut deep enough to uncover any part of it. At least no rocks older than Upper Tertiary have been discovered there by us. The remains near the north coast of Timor of the former more extensive cover of volcanic rocks resemble part of the volcanic rocks of the northern row, and it is very possible that similar rocks extend along the bottom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Active volcanoes (or groups)
Extinct volcanoes (or groups)
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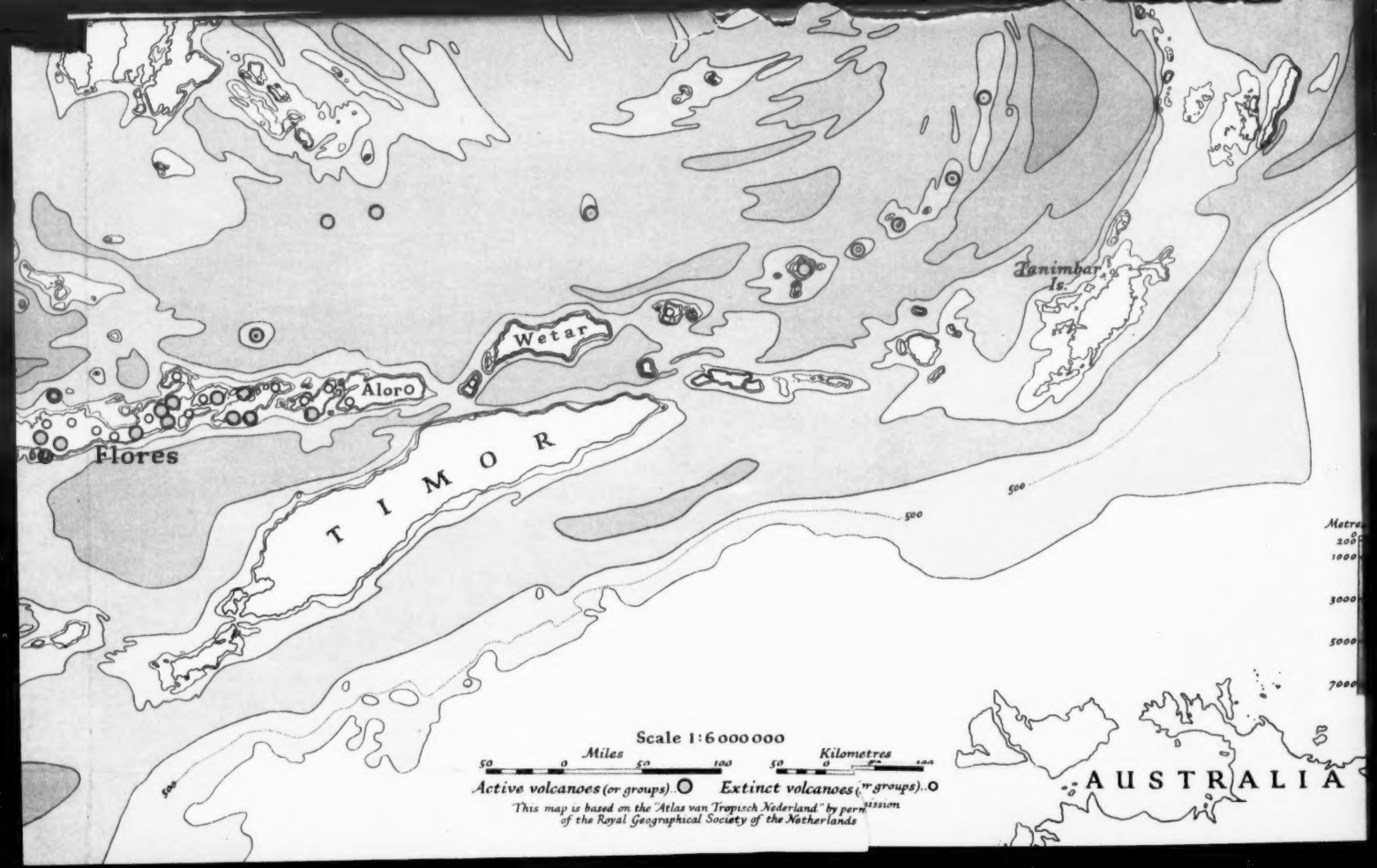


This map is based on the "Atlas van Tropisch Nederland" by permission of the Royal Geographical Society of the Netherlands

of the present Sawoe Sea between the two rows. Characteristic pillow structures and glassy surfaces point to submarine effusion of part of the lavas.

Besides the volcanic rocks there are in the northern row various, partly tufaceous, sediments. Intrusive granitic to dioritic rocks are numerous on Flores, and small exposures are also found on Alor and Wetar. The geological structure of the northern row proved to be fairly simple at all those places where our investigations were made. The Upper Tertiary rocks of this row have been folded in many instances, but neither imbricated structures nor overthrusts have been found.

On the island of Timor early Palaeozoic, Mesozoic, Tertiary, and Quaternary fossiliferous formations are found. The island is famous for its great wealth of fossils. Oceanic deposits of Mesozoic age are of widespread occurrence. Several different facies representing simultaneous periods of deposition under widely different conditions are found. In the northern zone crystalline schists form the highest summits of the island and there are also numerous steep isolated rocks, mostly of massive coral limestone, which is one of the strongly varying Triassic deposits of the deep and shallow seas found in this zone.

The geological structure of Timor is very complicated and of Alpine type. Intense folding and overthrusting has caused the present juxtaposition of groups of deposits of the same age but of widely different character. The

Fig. 3

structure has already been discussed by former investigators, mainly by Wanner[1] and Molengraaff,[2] and I cannot make any definite statement about the division into structural units before the results of our investigations have been worked out. It may be said however that the present structure is the result of long periods of movement.[3] As to the latest phase of mountain-building, seen in the morphology of the rising rows of islands and the adjoining submarine basins, numerous fractures and faults are the surface expression of these movements, but anatomical studies of the deeper structures which have not yet been exposed are of course not possible. A section through the central basin is given in Fig. 3.

The rate and direction of movement

The eastern part of the Malay archipelago may belong to the fastest-moving parts of the earth's crust at the present time. From what has been said above about the Mesozoic and Tertiary movements of the region investigated it is evident that orogenic forces have been at work during long periods of time

[1] J. Wanner, "Geologie von West-Timor," *Geol. Rdsch.*, IV, 1913, pp. 136–50.

[2] G. A. F. Molengraaff, "Folded mountain chains, overthrust sheets, and block-faulted mountains in the East Indian archipelago." C.R. 12th Internat. Geol. Congress, 1913, Ottawa, 1915, pp. 689–702.

[3] H. A. Brouwer on the tectonic evolution of the Lesser Sunda islands near Australia, in *Quart. J. geol. Soc.* 95 (1939) vi–ix.

and that the movements were characterized by an important horizontal component. Sometimes the vertical upward or downward movement may have been greater than the horizontal, but the final result shows a very important horizontal movement. The rate of these movements is unknown. It is also impossible to determine even approximately the rate of horizontal and vertical movement at the present time. There are no sufficiently exact determinations of longitude and latitude from which could be calculated the horizontal displacements of the islands with regard to each other and with regard to Australia. There has been no levelling done for an estimate of the vertical movements and there are no geodetic measurements which fix the mutual position of the islands and which could, when repeated after a certain time interval, make possible a judgment upon the relative horizontal movements. Our knowledge concerning the crustal movements at the present time in this very interesting region would be greatly augmented if exact geodetic measurements were made and repeated. With regard to the, geologically speaking, fast rate of vertical movement, the upheaved coral reefs and other recent deposits found up to great heights in both rows of islands are impressive. Other impressive features are the isolated rocks in the form of a toadstool, clearly showing water erosion but now standing on a watershed.

As examples of new cycles of erosion may be mentioned the gorges cut down in hard rocks and the water gaps. One of the accompanying plates (facing p. 10) shows a gap, obviously a steep dry valley, which now forms a pass in the mountain range. It may be of interest also to mention in this connection a problem which occupied us much during our investigations on Timor: namely, how far the rock masses of the *fatus* came to their present position by movements in deeper parts of the crust only, and how far by gliding on the surface. The slopes of the larger masses are covered with larger and smaller blocks, which often extend to great distances from the present site of the main blocks. It seems that not only running water has influenced the displacement of the blocks from their original source, when the rivers were flowing at a higher level, but sometimes a recent erosional depression has cut into the surface on which the blocks rest and a valley separates them from the main mass to which the blocks must have originally belonged. If we remember that Timor suffered a long period of Upper Tertiary denudation and for the greater part was covered by the sea before the most recent upheaval, it is clear that, considering only the recent tectonic evolution of the island, the blocks of the mostly unstratified or indistinctly stratified limestone may have been displaced far from their original source by marine and fluviatile denudation, and may now be found as isolated rocks, forming the highest summits of their surroundings. These rocks have thus not reached their present position by overthrusting alone, and it is clear that a judgment about the structure of the overthrust masses must take these facts into consideration.

It may be of interest to mention some ethnological data with regard to the recent movements of the rows of islands. Among the natives of many of the islands there are memories of catastrophes which caused submergence of the land below sea-level, or upheaval and enlargement of existing islands. Among the natives of Timor there is a legend that in old times the island was nearly entirely covered by the sea and that in the eastern part of Netherlands Timor

Travelling in the central part of Netherlands Timor W. P. de R.

Native house at Kaslioe, Timor W. P. de R.

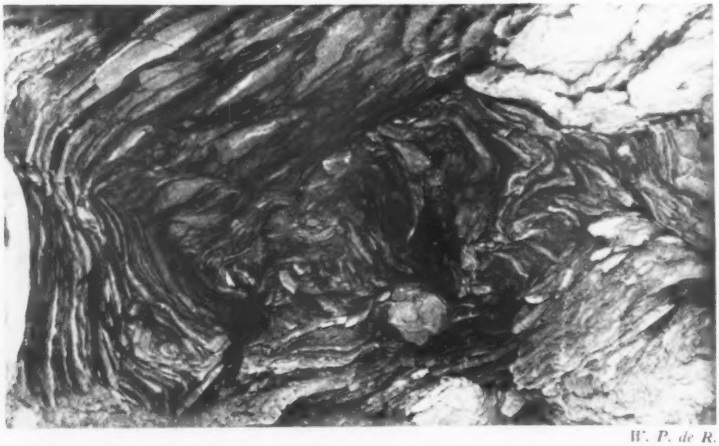
Market at Kefamenanoe, Timor W. P. de R.

J. D. de J.

Terraces of upheaved coral reef, Kisar

J. H.

Fringing reef and terraces of upheaved coral reef, Wetar



W. P. de R.

Intensely contorted zone at the base of the overthrust masses, Noil Pitaek, Timor

the highest mountain (Lakaän, 1525 metres) emerged as an island.[1] In the northern row of islands a legend mentions regions which, with accompanying earthquakes, disappeared below the sea, while the inhabitants escaped to other islands. One of the regions was an island or a land connection between Adonara and north-western Lomblen, where the Strait of Boleng is now found; the other was a land mass of which the two islands in the northern part of the Strait of Alor between Pantar and Lomblen are the remnants. It seems that the last-mentioned land mass disappeared before the first, because the legend tells that the ancestors of natives now living on Lomblen fled from the region of the Strait of Alor to that of Boleng, whence they later had to flee again.[2] These legends agree quite well with the geological facts, which prove the upheaval above sea-level of large parts of Timor during the most recent history of the island. I do not know how far one may surmise that the natives have recognized the upheaved coral limestones as marine deposits; this would diminish the significance of the legend as an indication of fast movements. The submergence in the straits between the upheaved islands of the northern row may be connected with the continuation of stresses by which the straits were formed. Vatter (*loc. cit.*) seems to have reasons to place the latter events about the middle or at the end of the seventeenth century. Submergence of sections of the coast is by no means a rare phenomenon accompanying earthquakes in the unstable parts of the archipelago.

Geographic distribution of volcanoes and the evolution of volcanic activity

It is well known that the great volcanic belts on the earth's surface coincide in a general way with the great seismic belts and with the young mountain systems, which both give evidence of recent crustal movements. The most marked of these belts is the "fire girdle of the Pacific." The evolution of volcanic activity during geological time proves that volcanic outpourings are related to both compressional and tensional disturbances of the crust. A magma will flow towards the places of least resistance and the life of volcanic action is influenced by the variations of magmatic pressure and by the variations of the stresses in the surrounding rocks. After extinction in one region the site of outpouring may shift to other parts of the disturbed zone where the distribution of stresses is more favourable to the upward movement of the magma. In the Netherlands East Indies two great zones of crustal weakness, the Alpine and the circum-Pacific mountain systems, interlace. Many young and partly active volcanoes are found. Volcanic rocks which are the products of older periods of volcanicity cover vast areas in the unstable regions where no active volcanoes are found, proving that shifting of the sites of outpouring has taken place. The Lesser Sunda islands near Australia are of particular interest in the life history of volcanic activity, because the geographic distribution of active and extinct volcanoes gives rise to suppositions about the relation between volcanic activity and crustal movements which might also prove to be useful in the study of other volcanic regions.

[1] H. J. Grijzen, "Mededeelingen omtrent Beloe of Midden-Timor," *Verh. batavia. Genoot.* 14 (1904) 3. Comp. also A. C. Kruyt, "De Timoreezen," *Bijdr. Taal-, Land-, Volkenk. Ned.-Ind.*, vol. 79, 1923.

[2] E. Vatter, 'Ata Kiwan,' p. 9. Leipzig, 1932.

The distribution of active and extinct volcanism is shown by the map facing p. 4. On Timor volcanism was active in pre-Tertiary and in Tertiary times. There are indications that the site of volcanic action has shifted. The youngest extrusive bodies are lava flows near the north coast of the island. Volcanic action died out completely before the end of the Tertiary. On the northern row of islands no volcanic rocks older than Upper Tertiary are known. Active and extinct volcanoes are found on all the islands except on those which are nearest to the southern row. Generally speaking, the volcanic action is the more prolonged the farther the islands are situated from, and the less they are adapted to, the Australian resistant mass (Australia considered with its submarine extension), as the map clearly shows.

The island of Wetar is nearest to this resistant mass and its volcanism was extinct first. Its extrusive bodies, now so much eroded as to have lost their original volcanic morphological forms, show a marked resemblance to what is left of the younger volcanic rocks on the northern part of Timor. On both islands these rocks often show the characteristics of submarine origin and they sometimes are found to rest upon or to be covered by marine deposits partly devoid of terrigenous elements, which must have been formed far from land in an open sea. Proceeding east or west from Wetar, the central point of the northern row of islands, first come regions where the morphology of the volcanic mountains shows that volcanic action became extinct at a later period than in Wetar, and yet farther to the east or to the west are regions in which active volcanoes are still found.

Farther north, a volcanic island is found to the north of Wetar and submarine volcanoes have become known to the north of Alor. Here the crust is deep below sea-level and there is still much uncertainty about the morphology of the sea-bottom, but it is of interest to note that on Wetar and Alor volcanic action is extinct and that farther to the north, at a greater distance from the Australian resistant mass, active volcanoes are found. It can hardly be accidental that due north from Wetar, which is nearest to the Australian resistant mass, volcanic action has already had time to build itself up above sea-level, whereas farther to the west it is in an earlier stage, not having yet appeared above sea. A complete belt of volcanoes as in the Wetar–Alor row of islands cannot be traced, too little evidence being available, but the facts strongly suggest the possibility of a phase of volcanism being in full growth here.

The unstable parts of the crust north of Australia have long been moving and the above statements suggest an active influence of the Australian mass on the volcanic activities in these adjoining unstable regions: the mass first giving possibilities of life to volcanism and at a later stage extinguishing it. The Lesser Sunda islands near Australia do not only show that volcanic action is dependent on crustal disturbances but also that both phenomena are dependent on the influence of the Australian resistant mass. The rising rows of islands adapt themselves to the resistance and the volcanic action retreats from it. Generally speaking, the adaptation is less complete and the volcanic activity has lasted longer in proportion to the distance from the resistant body. The erupting volcanic vents are stopped up first in the southern row of islands. The northern row has brought above sea-level the

outpourings of an intensive volcanic activity which has lasted until the present time, but we can observe how it is dying out, first in the parts which are nearest to the southern row and to Australia. Tensional movements may temporarily give some relief, but if movements similar to those in the past persist there will be a progressive extinction of volcanic activity in the northern row. The submarine volcanicity farther north may represent a youthful stage in full development, far from Australia and not yet suffering from its killing influence.

The Australian influence

In my outline of 1925 (*loc. cit.*) I emphasized that both the older thrusting and the most recent deformations in the region under consideration point to a relative movement towards the Australian continent. The absolute horizontal movements of the latest deformation could not be inferred from the surface characters of the present rows of islands, but it was my opinion that the importance of the vertical movements, which are so clearly evidenced by many morphological features, has often been overestimated, while the horizontal movements have been too much neglected. The tectonic evolution was seen as the result of forces which have been acting through long periods of time. Compressive stresses may have alternated with tensional stresses. Larger or smaller parts of the crust were upheaved above the sea to different heights and submerged to different depths. During periods in which the vertical component of movement did not cause an upheaval above sea-level, erosion did not affect the shape of the surface and no unconformities or disconformities in the succession of strata are found.

The present relief features show an adaptation to the Australian resistant mass. Geanticlinal and foreland movement in space and time, the possible resistance near the surface and at greater depth, or the possible compressions by pushing the moving masses in a narrower space explain the incomplete adaptation of the continually changing morphology. It may even be less complete at present than it has been before.

In the folding and overthrusting, which are the reminders of the older phases of mountain-building at greater depth, and the present morphology, which gives evidence of its most recent phase, and in the relation between tectonic and volcanic evolution, I consider the Australian influence of great importance in the structural evolution of the region. Of course the influence must have been changing and the successive movements may have been of very different intensity and direction; the influence was more local than that of the much larger Asiatic continental mass. If the Australian influence is maintained, the deep elongated sea basins will become narrower, the two rows may evolve to a single one and may even be pushed over the border of the Australian continental mass. A stage would then be reached which already exists along the northern border of the Indian peninsula.

DISCUSSION

Before the paper the Chairman (Professor KENNETH MASON) said: We have had many distinguished Dutch lecturers on this platform on other occasions, and it is my very pleasant duty to-night to introduce Professor Brouwer. He has

had several years' experience as a Government geologist in the Netherlands East Indies, after which he returned to Holland and took up his professorship. He has however managed to find time to take out students to study those extremely interesting islands in the Netherlands East Indies.

Dr. Brouwer then read the paper printed above, and a discussion followed.

Dr. E. B. BAILEY: I am delighted to have the opportunity of congratulating Professor Brouwer upon the splendid series of researches that he has carried out in the Netherlands East Indies. To-night I think he has convinced us that, keen as he is upon geology, he does not allow it to shut his eyes to the beauties of that wonderful region.

In congratulating Professor Brouwer I should also like to congratulate the Dutch nation, because they have in the East Indies one of the most interesting regions in the whole of the world, and they have made full use of their opportunity whether in scientific agriculture, in biology, in geology, or in the exploration of the sea-bottom by echo-sounding and gravity survey. In the geological work of which we have heard they have led the way in their own particular field. These islands in the East Indies are full of interest to people of every nation, and we are exceedingly grateful to the Dutch for providing information which will be of value to all parts of the world in interpreting the history of the globe.

Dr. DUDLEY STAMP: I should like to add my congratulations to Dr. Brouwer upon a lecture which has taken us into so many spheres. The Fellows of the Society may recollect that some years ago there appeared an article in the *Journal* by the late Professor J. W. Gregory, who held certain theories as to the direction of folding in the East Indies—that the main folds were from west to east and continued into New Guinea. May we hear whether Dr. Brouwer has solved this question and whether he can say "Yea" or "Nay" to what Professor Gregory wrote in the *Journal*?

Professor BROUWER: Our expedition did not work on the Kei islands, which are of particular interest in this connection. If I remember well, Professor Gregory suggested that the trend-lines of the Asiatic folded mountain ranges, continuing into New Guinea, cross the eastern Malay archipelago with a more or less east–west direction. In regions which are mainly covered by the sea and where therefore direct observations are lacking over large surfaces, there is room for differences of opinion. Moreover the direction of the trend-lines may not have remained the same during the long periods of evolution. I might say however that recently strong folding, with a more or less north–south strike, has been mentioned from the Kei islands. If this had been known to Professor Gregory, it would certainly have influenced his ideas about the direction of the older folding movements and the curve to north and south, which he explains by more recent fracture movements.

The CHAIRMAN: It only remains for me to propose a very hearty vote of thanks to Professor Brouwer, who has given us an extraordinarily interesting and most picturesque evening.

D. T.

Fatoe Leo, Netherlands Timor

A. L. S.

A pass in the ridge of volcanic rocks, Fatoe Kedoewa, Timor

H. A. B.

Water-eroded Mesozoic limestone, north of Fatoe Leo

J. H.

Upheaved coral reef near Toepoeti, Wetar

J. D. de J.

Lava flow resting on a marine deposit of white Globigerina limestone, Wetar

J. D. de J.

Submarine pillow-lava now upheaved, Wetar

LIFE ON THE UPPER WATUT, NEW GUINEA

BEATRICE BLACKWOOD

Evening Meeting of the Society, 5 April 1939

TO set out to study a Stone Age people by aeroplane sounds rather a paradoxical proceeding. But it can be done in New Guinea, so rapid has been the progress of air travel owing to the finding of gold in the interior and the enterprise of a few men who realized the possibilities of the aeroplane in solving the transport problems of the miners. I left Salamaua (on the Huon Gulf) at the end of July 1936 in a Gypsy Moth, and after half an hour's flight over mountain ranges was set down at the little landing-ground called Surprise Creek, on the Upper Watut river, within some six hours' walk of villages whose inhabitants only a very short while before had been entirely ignorant of metal, and who were actually still living at a stage of culture fairly comparable with that of the people of Britain in the neolithic period.

My journey was undertaken on behalf of the Pitt-Rivers Museum, on the suggestion of Professor Henry Balfour, with the object of learning what I could of the life of a modern Stone Age people, and in particular of their material culture and their methods of making and using stone tools, for in this way an ethnologist can sometimes fill up some of the gaps in the archaeological record. I am not here concerned with details of technique, but I shall try to give some account of the use a primitive people makes of the natural resources that are available.

The country in which I worked lies in the Morobe district of the Mandated Territory of New Guinea, near the boundary between the Mandated Territory and Papua. It is some 200 miles south-east of the Mount Hagen district, which was described to the Society by Mr. Michael Leahy in 1936 (*Geogr. J.* 87 (1936) 229–62). The two areas differ markedly from each other, both in their geographical features and in the characteristics of their inhabitants. The Mount Hagen natives, though also still in their Stone Age, appear to have attained a higher standard of culture than the people with whom I lived.[1]

An account of the pioneer patrols in the mountainous country between the Watut and the Papuan border was given to the Society by Mr. E. W. P. Chinnery in 1934 (*Geogr. J.* 84 (1934) 398–412). I need not therefore repeat the details of the first contact of these natives with miners in search of gold and with District Officers on patrol. Extensive gold workings have now been established on parts of the Watut river, and on the lower reaches of some of its tributaries, but the yield has not come up to expectation and many of them have been abandoned. The upper stretches of the creeks, where most of the native villages are situated, are not occupied by miners.

The Watut is a tributary of the Markham, which flows into the Huon Gulf at Lae. The Upper Watut is that portion of its course above its confluence with the Bulolo, a river nearly as large as itself. Below this, the character of the country and of the people changes. The Watut rises in a broken chain of

[1] *Cf.* Ross, "Ethnological notes on Mount Hagen tribes," *Anthropos*, vol. 31, 1936; and Vicedom, "Ein neuentdecktes Volk in Neuguinea," *Archiv für Anthropologie*, vol. 24, 1937.

mountains known as the Ekuti ranges, composed chiefly of granite and slate, and averaging about 8000 feet above sea-level, with peaks rising to approximately 12,000 feet.[1] This range forms the watershed of the Watut and the Tiveri, a tributary of the Lakekamu, which flows into the Papuan Gulf. Near its source, the Watut is enclosed by steep granite gorges, but later runs through a valley some miles across, probably once a lake formed by the drowning of river valleys after a period of erosion of the sedimentary rocks on the eastern fall of the Ekuti ranges. The altitude of the Watut valley at Otibanda Police Post is about 3500 feet. The country becomes increasingly rugged towards the north-west, rising to 7000 feet, 4000 feet above the Watut

North-east New Guinea

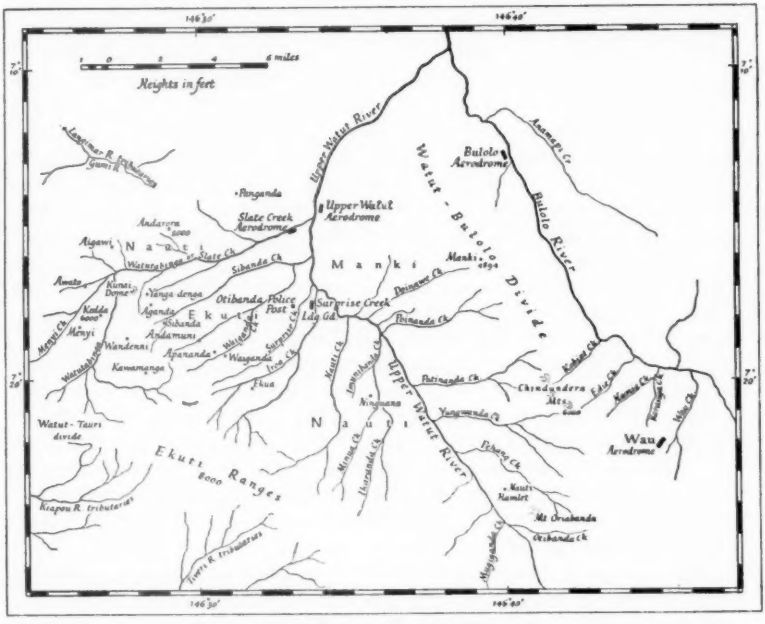
river. Here the rocks are the slates and porphyries of the Kaindi series, geologically the oldest in the area, the basement rock of the Morobe goldfields, made famous by the riches won at Edie Creek, on Mount Kaindi, some 20 miles south-east. More relevant to my immediate purpose, these rocks provide the natives with a hard blue-grey slate greatly valued for the making of stone implements.

The higher altitudes of the Ekuti ranges are uninhabited, being too cold for comfort. At about 10,000 feet you get above the firewood line. But spurs from the main ridge run down into the Watut valley, and it is on these, generally at heights of 4000–6000 feet, that the villages are situated. Standing in a clearing near one of the huts one looks out over the Watut valley, which is broken up into a series of low undulations, partly forested, partly covered

[1] For the geological details I am indebted to Mr. L. C. Noakes, of the Mines Department, Wau.

with what appears from a distance to be soft turf, but is in reality coarse intractable grass, often growing to a height of several feet. This grass, known locally as *kunai*, a name which probably covers several species, grows wherever there are no trees. It is kept down by being constantly fired by the natives as they walk through it, partly to catch the small animals hiding in it, but also to signal their progress to their friends watching on the distant hills, or just to make a blaze.

The river itself cannot be seen from the hills, being hidden by this rolling ground, but beyond it the ridge of the Watut–Bulolo divide rises to between



The Upper Watut valley

5000 and 6000 feet, above which the horizon is bounded by the chain of higher mountains on the other side of the Bulolo, of which an outstanding peak is Mount Chungol (8984 feet). Through a gap in this range the aeroplanes bound for Wau and Bulolo come in from the coast.

Looking in the other direction, nothing can be seen but heavily forested hills rising steeply in ridges to the main line of the Ekuti ranges. On both sides the spur on which one stands drops away sharply down to a small stream, beyond which the hill-side rises steeply to form another spur, and another, as far as the eye can see. These spurs are separated from each other by deep gullies, with streams, locally known as creeks, of varying size at the bottom. The smallest creek may quickly become a torrent after heavy rain. Smaller creeks or dry gullies run at right-angles down the hill-side to join them, making progress in any direction resemble the marches of the "famous Duke

of York" of the old nursery rhyme. There are single-file tracks leading to the gardens and from hamlet to hamlet, and also paths for hunting which appear to end suddenly without warning, in which case you wander through the bush till you pick up another, or return the way you came. These paths are kept clear by dint of each passer-by cutting off anything that happens to be in the way, unless it is too much trouble, when a new path is made round the obstacle; if it is a tree trunk, steps are cut in it by which it may be climbed over. A path left unused for a short time soon becomes overgrown.

The forest consists mainly of deciduous trees, with here and there a large pine (*Araucaria Cunninghamii*. Ait.) outstanding. Clumps of pandanus occur occasionally, and here you will probably come across a small roofed platform, sheltering the body of some one more or less recently deceased, which will remain there until it falls to pieces. A very pretty sight on many hill-sides is a patch of bamboos of several different kinds, their pale-green feathers waving in the wind. These are carefully cherished, being useful in an almost unlimited number of ways. Patches of wild sugar-cane are hard to walk through, but are useful for arrow-shafts. There is the usual wealth of small plants, ferns and mosses, many of which will be collected by the women of the party to be cooked as vegetables, and great variety of vines and creepers. Some of these provide the material for making string. Nearly everything seems to be utilized by the natives for food, medicine, magic, personal adornment, or in connection with their arts and crafts. Each plant, however insignificant, has its native name, which is known to almost everyone and is readily given on inquiry. Considerable interest was shown in my efforts to obtain specimens for my press.[1] Flowers are not plentiful, but there are some very beautiful flowering trees. The graceful spread and brilliant colouring of *Albizzia fulva*, whose flowers somewhat resemble mimosa, is a very characteristic feature of the landscape. The natives do not fell it, as they say the spirits of their dead like to sit on its branches. Orchids are found chiefly at a height of 6000 feet or over. At 3800 feet I found the flowers of the yellow rhododendron, which is, I believe, extremely rare.

Although only 7 degrees south of the equator, this country has a climate temperate instead of tropical by reason of its altitude. I kept temperature records as regularly as circumstances permitted, on a thermometer hung in the shade of my veranda. Judging from the nine months of my stay, there seems to be very little seasonal variation. Unfortunately, owing to the fact that my records were taken at three different villages, with slight variation in altitude and degree of exposure, the figures are not exactly comparable. As some indication of the conditions, I give the means for August, taken at Manki village (4894 feet above sea-level): mean temperature (F.), sunrise, 62°; noon, 77°; 2–3 p.m., 74°; sunset, 66°; 9–10 p.m., 62°. Minimum, sunrise August 9, 10, 11: 58°. Maximum, noon August 17: 84°. Greatest daily range, August 17: 22° (62°–84°). Means for the other months do not vary more than 3° from these. I took occasional, but not regular, records in the sun, and found temperatures of 100° not infrequent, with a maximum recorded of 102°.

I had no rain-gauge, but I noted in my diary when rain fell. The morning

[1] I am greatly indebted to the authorities at The Herbarium, Royal Botanic Gardens, Kew, for the trouble they have taken in identifying my specimens.

was usually fine, but a shower was to be expected in the afternoon. It was quite exceptional to have rain all day. Storms were not infrequent, accompanied by thunder. Wind, though sometimes high, never rose to a real gale. The village was usually shrouded in cloud early in the morning, when the dampness made one feel colder than the thermometer reading would suggest. The natives seem to feel cold at anything below about 70°, remaining indoors if possible and huddling round their fires. Sunny days were very pleasant, and even on hot days travelling in the bush was not too trying, but a patch of open grass land was disliked by the natives as much as by myself, and they would go a long way round to avoid it. A great advantage of the low temperature is that there are no mosquitoes. Taking it all round, I found it a pleasant climate in which to live and work.

The people of the Upper Watut country are known to their neighbours and to the white population of this part of New Guinea as Kukukuku. They do not refer to themselves by this name, but use a number of different terms applying only to local groups. But since it is convenient to have a single term for a people who appear to be a physical and cultural unit, and since the name Kukukuku has been adopted by government officials in their reports, I propose to use it. It is said to have been given to them by the Papuans with whom they have come into contact—usually in the form of raids in which they were the victors—and to mean "mountain people" with an unflattering significance not precisely defined. Whatever it means, they probably deserve it. They have a formidable reputation as fighters, and all the natives within their reach go in terror of them. If five Kukukuku appear on the top of a ridge, a whole village of the Lower Watut takes to its heels.

The Kukukuku are spread over the ranges forming the Watut–Tiveri watershed, and extend into Papua as far as the Upper Tauri on the south and the Vailala on the west. They are similar throughout in appearance, dress, and in such of their customs as have been recorded. This was clear from the Patrol Reports and photographs which I was able to consult during a short visit to Port Moresby, through the kindness of H.E. Sir Hubert Murray, Governor of Papua.

Owing to government regulations, I was obliged to confine my work to a small corner of the Kukukuku country, where the line marking off the "uncontrolled area" has recently been pushed back a little as a result of the excellent work done by the officers in charge of the district. Mr. K. W. T. Bridge, A.D.O., had been stationed at Otibanda Police Post, near Surprise Creek, for four years previous to my visit, and had been remarkably successful in making contact with these difficult people. My grateful thanks are due to him for having placed his knowledge and experience so generously at my disposal, and for my introduction to the natives, whose friendly attitude towards him ensured me a favourable reception.

At his suggestion, I started work in the village of Manki, on the Watut–Bulolo divide, where I lived for four months in a house built for me by the Manki people on a vacant plot in the village, so that I could see all that went on. This made a useful headquarters throughout my stay. But Manki was fast losing its old customs through contact with the miners and their indentured labourers on the Bulolo, and I was glad to receive an invitation to visit

the Nauti village of Andarora, on the other side of the Watut, where life was still much the same as it had been before the miners came. There I stayed three months, subsequently visiting villages on other spurs of the range.

During my nine months among the Kukukuku I was able to obtain a fair knowledge of their everyday life and their material culture, and was admitted to such of their ceremonies as took place while I was with them. But though they were far more friendly than I had been led to expect, they are very uncommunicative, and I was often reminded of the description given of them by Mr. Bridge before I left Otibanda: "As dour as the Scottish Highlanders of the olden days, when clan fought clan and all were against the outsider."

The Kukukuku with whom I came into contact belong to three different tribes—Manki, Nauti, and Ekuti. In physical type, in dress, and, except for minor differences, in material culture, the three are very similar, but they speak different dialects and are hereditary enemies both of one another and of the other Kukukuku tribes on the Kiapou, the Kareeba, and in the districts south and west. Much raiding has taken place in the past, and still continues in the uncontrolled area. The Manki are now friendly with one section of the Nauti, and recently some have taken Nauti wives, but they are still on bad terms with another section. Both Manki and Nauti are at loggerheads with the Ekuti, though in the area I visited they are sufficiently in awe of the Government to refrain from open warfare. With some difficulty I persuaded my Manki friends to come with me to visit an Ekuti village. We received a much more cordial welcome than they had anticipated, and they decided that the Ekuti were not such bad fellows after all. At the end of my stay negotiations were going forward for a marriage between one of my retainers and an Ekuti girl.

The Manki belong to the Langimar district, where their kinsfolk speak the same dialect. They told me that a small group had come wandering over and were afraid to go back because they had to pass through the Kiapou country, where the people were hostile. They settled first along the Watut near what is now Surprise Creek landing-ground, but after the coming of the miners they moved up to their present position. The Manki dialect is quite different from those spoken by the Nauti and the Ekuti, which closely resemble each other.

The Nauti have a few scattered hamlets on the right bank of the Watut, but their territory is mainly on the left bank of the river, on the eastern spurs of the Ekuti ranges, with a separate group on the west, on the spurs between Watutabinga Creek and Menyi Creek. The Ekuti seem to have come up from the south-west, where the main body of the tribe lives, and to have occupied some of the territory belonging to the Nauti and the Manki, separating the two sections of the Nauti just mentioned. The Ekuti are the largest and fiercest tribe, and are feared by both the others.

The Kukukuku have a characteristic appearance which, accentuated by their mode of dress and their hair-cut, makes them easily recognizable. They are short in stature, the men usually not much above 5 feet and the women rather less. An occasional tall person lifts them above the pygmy status, though it seems not unlikely that they have pygmy blood. Both sexes are sturdily built, with no superfluous flesh. Their skin colour is a medium

brown, sometimes with a lighter reddish tinge. They cut their hair short, except for a tuft at the top. The ear-lobe, usually of one ear only, is pierced and supports ear-rings, frequently made of the wing-shaft of the cassowary twisted into a circle and hung with oddments such as birds' beaks, tufts of fur, etc. The men, but never the women, have the nasal septum pierced. This is an important part of the initiation ceremony, the most important piece of ritual they have. As nose ornaments they wear pieces of stick or cane, or the teeth of dogs or pigs.

Women's dress consists of a fringed skirt of frayed-out leaves, hanging from a string round the waist, full in front and behind but leaving the flanks bare. Men wear several fringes of split reeds. Each fringe is on a separate string, and a number of strings are superposed, the effect being similar to that of a Highlander's sporran. The series of supporting strings also serves to hold in position a straight piece of bark cloth at the back, or the end of a cloak may serve. Both sexes and all ages wear these cloaks, a long heavy garment, made from the inner bark of certain trees beaten flat, gathered at the top with a string, by means of which it is hung from the crown of the head, being kept in place by the tuft of hair which is so characteristic of the Kukukuku.

Both sexes carry their valuables about with them in the form of strings of shells, teeth, etc. These are worn as necklaces by the women and as baldrics by the men, seldom *vice versa*, except as a joke. A wealthy woman will wear nine or ten different necklaces at the same time, though their weight must hamper her considerably in her daily tasks. One of the most highly prized forms of necklace is made of small cowries (*Cypraea annulus*. L.), sewn end to end on ropes of fibre. These cowries are a recognized form of currency both between natives and in trading with whites, from whom they are accepted as payment for food-stuffs, etc., at fixed rates. A small bag of sweet potatoes costs ten cowries. Large white *Ovula* shells (*Amphiperas* (*Ovula*) *ovum*. L.) are also highly valued, and are worn as pendants. Strings of teeth—dog, pig, wallaby, or human—are regarded as signs of wealth much in the same way as are diamonds among ourselves. Necklaces of bird bones, strung end to end, are also worn. The stem of a species of *Dendrobium*, strung in sections a couple of inches in length, makes a very decorative ornament owing to the rich yellow colour it assumes when dry. This is worn by women only. Many people will be seen wearing necklaces and baldrics of fibre-string; these are signs of mourning, and as they are worn for a considerable time after the loss of a relative, they are much in evidence in most villages.

An essential part of the outfit of both men and women is a net bag, which may contain anything from babies to sweet potatoes, from shell necklaces to the spoils from the latest raid. The men wear them on their arms, pushed back to the shoulder; the women carry theirs on their backs, suspended from their foreheads by a band woven in one piece with the bag. A woman returning from the garden will have four or five of these bags, the lower ones full of garden produce, while the top one holds her baby, with a bark-cloth cloak hung over it to keep off sun or rain. Balanced somehow on her shoulders or her head she probably has also a load of firewood or a couple of long bamboos full of water. The babies have no other cradle. When they are not being

carried they are slung in their string bags from the roof of the hut, or are put to lie on them on the ground.

No census of the Kukukuku has yet been taken or is possible, except in the few villages under control. Mr. Bridge told me that in the uncontrolled area on the Langimar and Gumi rivers to the west there is a large population, and he estimates the number of Kukukuku in the Mandated Territory to be at least 50,000.

While patrolling the Langimar district, Bridge saw villages of three or four hundred people, surrounded by stockades. But in the area known to me the people prefer to live in scattered hamlets, one, two, or three houses in a group, rarely as many as half a dozen together. The village of Andarora comprised about twenty houses, but it was not possible to see more than two or three from any given point. Each hamlet generally belongs to a family group, perhaps an old couple and their married son. Many huts are encircled by defences consisting of two or more lines of small trees, generally a species of dracaena. One Ekuti hamlet had four such circles, with wild sugar-cane growing 6 or 8 feet high between the second and third. The outer ring was composed of bamboo stakes set upright close together, to a height of about 20 feet. The only part left unprotected was a place where the ground fell away too sharply to permit of attack. There were six houses inside the inner circle, and one between the first and second. In the more settled parts, houses are now being built without defences.

The site generally chosen for a hamlet is on the top of one of the spurs running down into the Watut valley. Behind, the ground rises very steeply, so that from a short distance one can look down on the houses almost as if from the air. The slopes above and below are cleared in patches for gardens. A village will be scattered over two or three spurs, with perhaps a house or two in the valleys between. Very little bush is cleared round these scattered houses, and one comes upon them suddenly, by way of a narrow track.

There are two main types of house. One is circular, with a conical roof, thatched with grass if easily obtainable, but more often either with bamboo leaves or the long thick waterproof leaves of the pandanus, bearing an absurd resemblance to corrugated iron, and nearly as efficient. The roof comes down to within a foot or so of the ground all round; you crawl under it and through a small opening, to find a circular corridor running round inside the outer wall, with the door into the house itself on the other side, so that any one entering must crawl round half the circumference of the house, during which he is subjected to inspection, and if necessary to prevention, from within. This is the type of house favoured in districts where raiding is liable to occur.

The second type, found in the more settled districts, is circular or oval or sometimes rectangular, with a pent-house roof, much higher walls, consisting of logs piled obliquely, and no passage. The floor of both kinds is raised a little off the ground and is made either of broad strips of bark or of split bamboo. The hearth is between the door and the centre of the hut, and is carefully prepared with alternate layers of leaves and mud. When left empty, the house is fastened up by laying logs against the door opening and piling branches and brushwood outside. An old shield is sometimes used as a door. The Kukukuku trusts no one.

The Watut valley from a spur of the Ekuti ranges

An Ekuti man

A wealthy Manki woman

In the gardens very rough lean-tos are constructed, either against the hill-side, which may be dug away a little to make a flat floor, or on a framework of poles, open on three sides. Shelters of leaves and branches are constructed when a night has to be spent in the bush.

There is a constant coming and going between hamlet and garden, or from hamlet to hamlet to visit relatives, so that the whole population of a given village is probably never all present at once. This habit has led to the Kukukuku being described as "semi-nomadic," but I think this is an overstatement, at least so far as the groups I visited are concerned.

The Kukukuku has only one method of travelling—on his own two feet. Over most of his country no other method is possible. He has no boats, for his mountain streams are not navigable. When he comes to a creek he walks straight across, making judicious use of its plentiful supply of boulders. Should the water be too deep or the current too swift, he fells a tree in such a manner that it falls athwart the stream, or walks along the bank till he comes to a better place, or camps near by till the river is lower. He has only one pack animal: himself or, more often, his wife. If necessary, two men will sling some heavy object, such as a pig, on a pole and carry it between them, but they much prefer to cut up their kill in the bush and leave it for the women to bring home piecemeal in string bags.

The gardens are of necessity on the steep mountain-sides, since no level ground is available. They bear no resemblance to the orderly square plots of the Mount Hagen tribes. The Kukukuku clears his plot only so much as is absolutely necessary. He does not even bother to fell the trees, though the firing of the plot to get rid of the brushwood kills them. The gardens can be distinguished from the surrounding bush as lighter patches on the hill-side from which regiments of bare white trunks rise in disorderly array. Large trees which require to be removed are felled by concerted effort. To fell a large pine with stone tools is a long business, so a platform is set up all round it at the desired height from the ground, usually about 5 feet, and on it sits a circle of men, each chipping at away his own bit. Some one will go off for a meal or a sleep, and his place will be taken by another man, and so the work goes on for several days. Or a hole may be cut in the side of a tree, and fire fed into it from a platform built beside it. Large trunks, when felled, are left lying and used as paths, or to bridge streams or gullies. Often the path follows a succession of these logs right across a garden without once touching ground.

No great amount of trouble is taken to keep the garden weeded, and often it is not even fenced, unless wild pigs are troublesome. Fences, where they exist, are made of small logs laid horizontally between two rows of stakes. There are no gates, but sloping logs laid against the fence enable it to be climbed. Garden tools consist of an adze for clearing the bush and a digging-stick—a strong pole about 5 feet in length—for making holes in which to plant and for uprooting the tubers when ready. The men do quite a large share of the planting. They also help with what little weeding is done, and even condescend to carry home bags of produce. I noticed this particularly because it is definitely "not done" in other parts of New Guinea.

By far the most important crop consists of sweet potatoes. Taro and yams

are grown occasionally, but the soil is said not to be suitable for them. Sugar-canes are planted among the sweet potatoes, and will continue to bear edible canes after the rest of the garden has ceased to be productive. Worked-out gardens are abandoned. Several different kinds of banana are planted, most of them not very palatable, even to the natives, unless cooked. A few other plants are cultivated as vegetables, but most of the green vegetable food of the Kukukuku is obtained from plants found wild in the bush, of which a great variety is utilized. Bracken tips and young bamboo shoots are considered a delicacy.

The staple and often the only dish for every meal is the sweet potato. This gives the Kukukuku a diet with marked excess of carbohydrate. There is no need for such monotony, as the climate is very suitable for the cultivation of vegetables of almost every kind. Tomatoes, cabbage, and maize have been introduced and are now being cultivated by the Manki. At present most of them are sold to the miners at Bulolo, as the natives are slow to appreciate them as additions to their own diet. In a plot of ground given to me with my house at Manki village I grew very successfully peas, runner beans, carrots, beetroot, and lettuce. The villagers were interested in these new products, and promised to grow the seeds I gave them.

The Kukukuku is not by choice a vegetarian. His meal is not complete unless it has at least a "relish" of meat. But the problem of securing flesh food is a troublesome one. He possesses pigs, but they are valuable and are reserved for special occasions. There are wild pigs in the bush, but they are rather scarce and not easy to kill. He may have the good luck to catch a wallaby, or some other small marsupial, of which there are several kinds, including the cuscus, a phalanger, locally called opossum. Tree-rats, iguanas, lizards, and snakes are all acceptable. A successful hunt may result in the capture of a cassowary, which will provide a small hamlet with meals for a couple of days, but these again are not very plentiful and are hard to catch. A good hunting-dog will keep a cassowary occupied while his master lets fly an arrow at close range. A dog can kill a small cassowary unaided, but not a large one. Cockatoos and pigeons are plentiful. Birds of paradise are killed by the natives for their feathers rather than as food. Birds are shot with bow and arrows, usually from a hide-out of branches built near a stream where they are accustomed to drink. The smallest thing which can provide a mouthful of flesh food is carefully collected, even to a nestling the food value of which seemed a far from adequate return for the trouble expended in carrying it home. A species of white grub collected from rotting tree trunks is a special delicacy, and is either eaten raw or roasted on leaves over the fire.

There is a form of trap for wild animals consisting of two lines of stakes with a log balanced between them; the animal in reaching for the bait sets free a twig which releases the log to fall on its back. Pitfalls are also used, with spikes of wood at the bottom, camouflaged with boughs and leaves and baited with taro laid at one edge of the hole.

Fish are shot with ordinary bow and arrows. Sometimes a number of men and boys will combine to dam a stream, when the fish are more easily seen in the shallows that remain after the main stream has been diverted. It takes a whole day to make an effective dam. The women come and look on, and

Nauti man equipped for journey

Method of wearing bark-cloth cloak

Man laden with garden produce, bananas, and sugar-canes

Woman with garden produce, digging-stick, and baby in net bag

canes

net bag

cook meals by the river side. Another day is spent in fishing; at the end of it the force of the stream has generally destroyed the efficiency of the dam, which is left to be carried away piecemeal by the river in course of time. Two days' strenuous labour of this description may produce perhaps twenty small fish and a couple of big ones, but as with fishermen elsewhere, the catch is not the only thing. Desultory fishing for eels, which are fairly plentiful, is carried on, and small fish can sometimes be caught by hand in the rock pools. Fish are also stunned by throwing in pounded derris root, a practice common to many primitive peoples.

The Kukukuku do not know how to make pottery, and have no means of obtaining any. For cooking purposes they use as a substitute lengths of green bamboo, into which leaves, pieces of meat, etc., are pushed, sometimes with, sometimes without water. The bamboos are laid over the open fire. They serve the purpose excellently. I have seldom tasted anything more delicious than certain kinds of mushrooms cooked in that fashion. Another cooking method is to roll the food in a length of bark, holding the roll together by putting in spikes of wood, after making holes for them with a bone pricker. This too is laid on an open fire. Sweet potatoes, bananas, and flesh foods are cooked in a depression in the ground filled with hot stones and covered up with layers of leaves and soil.

The water supply presents no difficulty, since mountain streams abound. But it may have to be carried up several hundred feet to the hamlet on the top of the spur. This is done in bamboos often 6 feet or 8 feet long. The bamboo containers are used not only for carrying and storing water, but also as drinking vessels. Small children may be seen tipping water into their mouths from bamboos at least twice their own length, without spilling a drop, a feat not as easy as it looks.

There is no method of obtaining salt, and no access to the sea from which the coastal natives draw their supply. A substitute is made by burning the leaves and stalks of suitable plants. Those in my collection have been identified as belonging to the *Impatiens* family (among them *Impatiens nivea*. Schlechter, and *Impatiens linearifolia*. Warburg). The resulting product looks not unlike very fine brown sugar and has a slightly bitter taste. European salt is a very useful article of trade in this district; I used it extensively for the purchase of food-stuffs, etc.

Tobacco is cultivated in the sweet-potato gardens or in special patches. It appears to have been introduced fairly recently, and I was told that some of the Kukukuku farther west do not smoke. So far as I could ascertain, only one variety is cultivated (*Nicotiana tabacum*. L.). Contrary to the usual custom, the home-cured variety is preferred by the Kukukuku to trade tobacco. Leaves are dried by being laid separately on a bamboo frame fixed over the fire, or on the firewood where it is not burning. They are often smoked immediately they are sufficiently dry, but may be tied in bundles and hung up in the house for future use. Pipes are simply lengths of bamboo stuffed with a filter made of fibre from the outer husk of the wild areca nut. The smoker holds one end of the bamboo tube to his mouth and puffs the smoke out through the other. A variant of this has a small hole bored near one end, in which is placed a small cane holder. Or the holder may be dispensed with,

and the tobacco, done up in a leaf folded to the shape of a cone, may be kept in position by inserting the pointed end of the cone into the hole. In any case, the method of smoking is the same. One or two puffs are taken, and the pipe is then put down or passed to a neighbour.

Everybody chews the betel mixture, but only a small wild variety of areca nut is available, and the place of lime is taken by plant ash (*Archidendron* sp.) in default of coral. It seems to have the desired effect. There is no lack of betel pepper. The stems of the vines are chewed as well as the leaves and fruit.

The Kukukuku cannot be described as rich in personal possessions. No great skill is shown in the manufacture of such things as they have. They make nothing approaching the finely worked axes characteristic of the Mount Hagen natives. Their tools are rough adzes, the blades consisting of pieces of stone from the creeks, first roughly abraded with another piece of stone, and then ground into shape. The surface is usually ground all over, but sometimes the worker is content merely to give the implement an edge, leaving the rest of it showing marks of the abrading tool. Both forms can be paralleled from a series of neolithic implements from Europe. They conform to the usual New Guinea type in being either circular or oval in section. (The Mount Hagen blade, with its rectangular section, is unique in New Guinea, so far as we know at present, and its presence there constitutes an interesting ethnological problem.) Some are hollowed to act as a gouge. They are of various sizes, but are always hafted in the same way. The haft consists of a piece of wood cut from the trunk of a tree at a place where a bough branches off. The portion of trunk is hollowed to receive the blade, and the bough acts as handle. The blade is bound in with a length of rattan. This tool is used for cutting down trees, clearing bush, and similar heavy tasks, also for finer work such as trimming bows, when it may be held close to the blade. It is not used for fighting, except in emergencies.

The fighting weapon is the stone-headed club. Those made by the people of the Upper Watut are all ball-shaped. On the Kiapou disk clubs are typical, and star-shaped and pineapple clubs may also be seen. The perforation for the handle is made by pecking with a pointed stone first at one side then at the other till the holes meet in the centre of the stone. The haft is fixed in with the resinous gum of a pine, and may be ornamented with red seeds or with teeth.

Wooden clubs are also in use; these consist of a hard piece of root or some knobbly growth on a branch, roughly shaped and put through fire to harden it. Flat "sword clubs" are made by trimming a length sliced vertically from a tree trunk. Shields are large heavy slabs of wood shaped from the buttress growths at the base of certain trees. They are roughly oval, with two holes in the centre through which a thong is passed for carrying. Some have a slit at the top through which the warrior can watch his opportunity.

The favourite weapon of the Kukukuku is the bow and arrow. He has no spear—it would be of little use in thick bush. Bows are strung with bamboo planed down with a sharp piece of stone. Arrow shafts are made of the stems of wild sugar-cane, and their tips of hard palm wood. They are neither barbed nor feathered, and are used preferably at rather short range. A man is

A hamlet at Andarora with a dracaena stockade

Part of Ekua village

Garden with sweet potatoes and sugar-cane

House with a musical bamboo

Garden with sweet potatoes and sugar-cane

seldom seen without his bow and a sheaf of arrows, even in his own village. If he goes far afield, say to visit relatives or to attend a ceremony in a neighbouring village, he takes his adze on his shoulder, his bow and arrows in one hand, and a string bag containing a spare cloak and a smaller bag with his valuables in the other, and sticks a club in his belt—"in case."

Metal tools can now be obtained from the miners, but that does not take the Kukukuku out of the Stone Age, for he uses them exactly as he does his old stone tools. Apart from knives, the thing he most covets is a plane-iron, and this he hafts and uses exactly as if it were a stone blade. Sometimes there will be a raid on a miner's tool store and a spade or two will disappear—but not to displace the digging-stick as an agricultural implement. The spade is cut into three strips of the right size and shape to serve as adze blades.

The most valuable single asset the Kukukuku possesses is the bamboo. As the coconut is to the coastal native, so is the bamboo to the mountain people. It is used, as we have seen, for a defensive stockade, for thatch, for a bow-string, a cooking-pot, and a water container. It serves also as a lime pot, a piece of stick being used as a spatula. Its young shoots are eaten. Small pieces are carried for the safe-keeping of various personal treasures, such as bone prickers, small ornaments, and so on. Sections suitably cut serve for knives. A bamboo knife is extremely sharp. When its edge becomes blunted all that need be done is to loosen a strip at one end with the teeth, tear it off, and a new sharp edge appears. Pig and cassowary can be cut up with bamboo knives as deftly as any butcher could do it with his steel knife. When travelling at night a long bamboo with one end split is carried as a flare. Some of these torches are 10 feet long, and I have seen a child who looked no more than four or five brandishing a 6-foot piece with a foot of flame at the end of it.

The bamboo also furnishes the Kukukuku with his musical instruments. Small ones are bound together as Pan-pipes. A jews' harp is made from a curved half-section with a raised strip as tongue. It is held against the teeth and vibrated by pulling a string attached to the other end. A somewhat unusual form of aeolian instrument is made of a slender bamboo, sometimes 30 or 40 feet long, in which rectangular holes are cut between the nodes. This is set up in front of a house where it will catch the wind, and gives out a very pleasant medley of soft notes.

An unexpected, and to an ethnologist very disappointing, characteristic of the Kukukuku is that they seem to be totally devoid of any interest in decorative art. Except for a few zigzag lines on their arrow shafts, they make no attempt to improve the appearance of anything by means of ornament. Bamboo pipes and lime pots are simply lengths cut from a stem, neither carved nor painted, as are those of other primitive people who use bamboo for these purposes. No carving adorns their house posts or the handles of their tools and weapons, in fact, the art of wood-working is entirely confined to the making of the implement. Lines are incised in stone, but only for the purpose of roughening the surface to make a bark-cloth beater. Not the slightest trace of a pattern is ever painted on bark-cloth cloaks or on anything else. Their personal ornaments consist merely of objects strung together, no other work being done upon them. This absence of decorative art cannot be explained on the ground that they lack suitable tools, for the people of the

Gulf of Papua or the Sepik, to name only outstanding examples, developed a very remarkable art with no better ones.

I have often wondered whether the lack of artistic development is inherent in the character of the Kukukuku or whether it is due to the hard conditions under which they live. It is correlated with a general austerity in their culture, comparable with nothing else in New Guinea or, indeed, in the whole Pacific. Ceremonies are few and relatively simple, while the social and sexual aspects of life occupy a far less important place in their scheme of things than is the case elsewhere. Their main interests are food and fighting, the one often undertaken for the sake of the other, but as often, apparently, for its own sake.

Comparison with our own Stone Age brings out some interesting points. The way in which the Kukukuku make and use their stone tools and weapons is probably very similar to that in which such implements were made and handled during the neolithic period in Europe. But in other respects their culture is poorer. For example they are without the arts of pottery-making, weaving, and basketry, all of which were practised by European neolithic man. They have however provided themselves with effective substitutes by skilful use of the materials available. Comparison apart, they are interesting because they provide one of the few remaining opportunities of studying the way in which a modern Stone Age people reacts to its geographical environment.

DISCUSSION

Before the paper the Chairman (Professor KENNETH MASON) said: One of the last things that our late President, Professor Henry Balfour, did was to ask Miss Beatrice Blackwood, the lecturer, to prepare a paper for an evening meeting of the Society. There is no need for me to introduce Miss Blackwood because I am sure many of you were present last Monday when she showed an extraordinarily interesting film.

Miss Blackwood then gave the paper printed above, and a discussion followed.

Mr. H. J. BRAUNHOLTZ: I feel it a great privilege, as a mere anthropologist and not a geographer, to be asked to speak first after the interesting lecture to which we have listened. Miss Blackwood is to be heartily congratulated, from a number of points of view, on the paper she has given. As perhaps a more anthropological than a geographical paper, it has been of particular interest to me.

Until quite recently the Kukukuku were very little known, apart from a redoubtable reputation amongst the people on the coast of New Guinea. The present Governor of Papua in one of his books recalls that they used to make raids right down the coast to Karema. I believe the same tribe in the north still raids the coast. The fact that Miss Blackwood has been able to go amongst these people and live with them after only a few years' preparation of the ground by the administrators speaks a great deal for her personal character and for the special training she had. From knowing practically nothing about the Kukukuku we have this evening had a most realistic and vivid account of all the details of their life, and for that all anthropologists must be profoundly grateful. Miss Blackwood has probably only skimmed over the surface of the large amount of material she must have collected, and I much hope we shall be able to read a full account before long.

One of the objects of going out to the country was to collect material from a

people who are still living in the Stone Age. Such people are becoming extremely scarce. There are still a few here and there, especially in the interior of British New Guinea and in certain parts of Dutch New Guinea and Australia. It was thought that the collection of material from Stone Age people would help to throw light on the old and the newer Stone Age of Europe. That was one of the leading ideas of General Pitt-Rivers when he formed his famous collection now at Oxford, as well as of his friend Henry Christy, whose collection is at the British Museum in the Department of Ethnography. That is an idea which I hope will not be lost sight of, because it is evident that by studying the actual technique which the Stone Age people followed we shall be in a better position to understand our own past and the stone tools and certain objects made by stone tools which are the only survivals from the Stone Age in Europe.

One must, of course, beware of pressing analogies too far. Miss Blackwood has told us that a large part of the culture of these people is based on bamboo. It is obvious that in western Europe bamboo cannot have formed any part of the culture. Therefore we must be careful in regard to the inferences we draw. However, from the point of view of the actual making of the stone tools there is no doubt that we can come to a better understanding from the description we have been given. I was particularly interested in the method of boring the stone club-heads, because from their appearance one would imagine that they had been ground out by a rotatory motion. We have been shown that the operation was one of percussion.

Miss Blackwood said that the Kukukuku are a very homogeneous group of people, both physically and culturally. I am sorry to seem to raise any doubts as to that, but judging from the photographs it seemed to me that many of them were almost indistinguishable from Melanesian tribes, negroid in type; in fact some of them looked extraordinarily like the peoples of the Northern Solomons. Later Miss Blackwood showed others who seemed to be typically Papuan, with rather strongly marked long and curved noses. It appeared to me that there is more than one physical type amongst these people.

I hesitate to rush into the thorny pygmy question where so many anthropological angels have feared to tread. I have however gathered that some eminent anthropologists are coming to the view that there is no certain evidence of an original pygmy race in New Guinea. It seems that there are groups of people, small in stature, dotted about in various parts of the country, especially in the remoter mountain districts, and it is tempting to suppose that these small people are the remnants of the original inhabitants who were gradually forced up to those regions. But against that there does not seem to be any homogeneous physical type to which those small people belong. The one common factor in connection with all these pygmy peoples seems to be their small stature. I wonder whether that can be accounted for either by environment or by an almost entirely starchy diet? At any rate there appear to be certain climatic or environmental factors which may have a stunting effect. If we assume that these small people are part of a single pygmy race which originally existed in New Guinea it is going to be very difficult to account for their different types. Only a few years ago Lord Moyne gave an interesting report on a group of pygmies on the middle Ramu river. He pointed out that even in this small group very different types occurred. There were some people rather like the pre-Dravidian stock of southern India; others like people from southern China. The question is whether it is possible to single out anything apart from stature which can be said to be characteristic of the New Guinea pygmies as a group. Brachycephaly has been supposed to be a hall-mark of pygmy people.

Those who have noted pygmy groups have also called attention to the convex upper lip, which I did not notice particularly in the types Miss Blackwood showed. If there was an original pygmy race in New Guinea before other people went there, all one can say is that their features have been obscured by the different groups in Papua and New Guinea who have come into contact with them later and that the only common denominator which remains is their small stature.

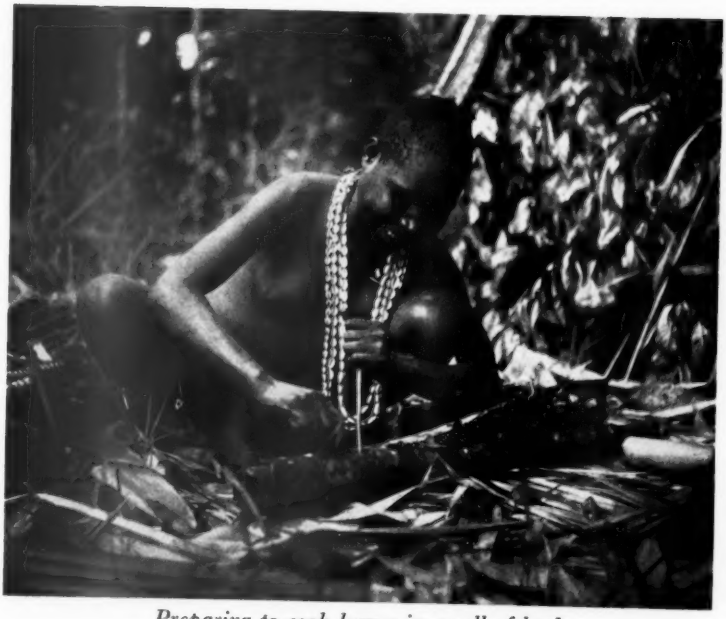
I was astonished to hear of the absence of art amongst the Kukukuku. That is something almost unique in New Guinea, which is peculiarly rich in decorative art and ceremonial life. It is difficult to account for the lack of art amongst the Kukukuku unless they have been so occupied with fighting and keeping themselves fit that they have not had time to bother about it. It may be a result of a hard environment.

I should like Miss Blackwood to say from which direction they get their shells. I should imagine that they would come both from the south and the north. At any rate, some of the Kukukuku are probably more in touch with the southern coast than with the north. Have they no traditions as to their origin or how long they have been in the country?

The stone bark-cloth beaters interested me. I do not remember to have seen the type previously. In the British Museum we have a stone beater of a similar type from the Solomon Islands, but that we have always hitherto explained as a nut-cracker.

Lord MOYNE: Miss Blackwood has shown us a district which is of remarkable interest because it is in such astonishing contrast to the civilization which is growing up only a few miles away. When looking at one of her beautiful photographs showing a view over the Bulolo river I recalled that, under the eye of the Kukukuku with their stone clubs and their bows and arrows, are great dredgers weighing 2000 tons of steel which have been flown over the mountains in 5-ton parts and assembled within a few miles of these primitive races. Until Miss Blackwood went to the district and spent some months studying the people, no trained anthropologist had ever devoted any attention to the culture which one fears will so rapidly die out. I have only seen the Watut river from an aeroplane, flying down from the gold mines. I have not seen the Kukukuku to be able to compare them with the people in Ramu and the pygmies of the foothills of the Aiome Mountains, which are about 200 miles to the north-west. Looking at Miss Blackwood's pictures there was a remarkable likeness in what seemed to be unimportant details, such as the beads made of the stem of a species of *Dendrobium*, which one also found up on the Ramu river round the necks of the pygmies; and the bamboo belts made in strips for lighting fires; also many of the string or net bags in which they carry food, together with many of the articles of their diet of which Miss Blackwood has spoken. And yet with all these likenesses the Kukukuku present such surprising contrast to the people with whom, judging from these evidences, they must have been in touch. Their bows have simple pointed ends without those ingenious balls at each end for quick stringing. Their stone clubs are not found in the Ramu region. It is curious that these weapons should be localized in narrow districts in contrast to the wide extension of other types; as, for instance, celts of almost indistinguishable pattern found throughout vast areas of the Old and New Worlds. I do not know what was the material of the Kukukuku implements. Perhaps Miss Blackwood will tell us. The axes which I brought back from the Ramu were of much simpler and cruder workmanship than those which Mr. Michael Leahy found, but they were of the same material. The Geological Museum came to the conclusion that some of them were epidote-chlorite and others

Carrying water in bamboos



Preparing to cook leaves in a roll of bark

Making bark cloth

Making a club from a tree-growth with a stone-bladed adze

nephrite, the latter being an extremely brittle black rock with a great deal of iron in it. It is puzzling why the natives should take the trouble to get this brittle rock in order to make stone implements. It would be interesting to hear from Miss Blackwood where her people get the material and whether the implements are made by specialists.

Mr. Leahy in his book said that there was behind the Wahgi river and the Sepik a neutral zone where the making of implements was carried on in perfect peace. It was a neutralized armament factory and the warring tribes apparently left the weapon-makers in peace to pursue their age-long craft of wearing down the rock into beautiful stone axe-heads by careful trituration with sand, while their impatient customers were waiting to buy them in order that they might break each other's heads!

Could Miss Blackwood tell us whether the making of these implements is a localized craft and whether she found anything at all like a dual-purpose lenticular-shaped axe or adze which could be used for either purpose by rotating it in its haft? That does not seem to have been the character of the implements Mr. Leahy found, but one came across them constantly on the Ramu river. I wonder whether that useful double-purpose adaptation was a peculiarity of the Ramu river area or was also used sometimes when the people wanted an adze and sometimes when they wanted an axe to cut down a tree. It is curious that the axes from the Mount Hagen district, which were of the beautiful green stone which Miss Blackwood mentioned, are so extraordinarily brittle. I sometimes wonder whether they are used only for ritual purposes, because if they are used in war I should think they can only keep their edge, or indeed their form, for about one blow before being completely shattered. It would be interesting to hear a little more from Miss Blackwood with regard to the stone implements and whether they are all made by rubbing together stones, as she showed us in one of the photographs, or whether she found any of them fashioned by the method which Mr. Leahy noted of rubbing with very hard sand.

Miss BLACKWOOD: In regard to the first point raised by Mr. Braunholtz, I should like to say that in describing the Kukukuku as "a physical and cultural unit" I did not intend to imply that they were homogeneous. Each small group certainly comprises a variety of physical types. The point I wanted to make was that the local groups calling themselves Manki, Nauti, and Ekuti are sufficiently similar, both physically and culturally, to one another, and to certain groups on the Papuan side, to justify the use of a single name for them all, and as it is customary in New Guinea to apply the term Kukukuku to this whole group, I have continued to use it for the sake of convenience.

I believe that the question whether there is or was a pygmy race in New Guinea is still under discussion. I do not suggest that the Kukukuku are pure pygmies, but only that they may have a pygmy strain. I would agree with Mr. Braunholtz that the physical type is mainly Papuan, with, perhaps, some Melanesian types here and there. But in character and temperament they are very different from the Melanesians, at least from those I knew fairly well in the Northern Solomons. We have to account somehow for their stature and build and other non-Papuan characteristics. If we consider that the so-called pygmies are entirely a product of environment, the interesting and complicated question arises, What sort of environment produces a pygmy, and why?

Mr. Braunholtz mentioned the rich ceremonial life that is characteristic of most New Guinea peoples. In this respect the Kukukuku are as surprising as in their lack of decorative art, perhaps for the same reasons. Their most important series of ceremonies are those connected with the initiation of their boys,

and even these are poor, both in ritual and in accessories, compared with what is found in other parts of New Guinea. There can be few people so difficult and so secretive as the Kukukuku, and after only nine months among them, with poor knowledge of their language, it is impossible to be sure what they were concealing. But if there had been a rich ceremonial life I should, I think, at least have known of its existence.

I do not know where the shells come from. The people say that they get them from other natives. The government officials now use them as payment for food bought while on patrol.

The Kukukuku tradition of origin is embodied in a legend which I heard in a number of villages, with slight variations. It is said that there was once a man—where he came from nobody knows, and they think you are a fool if you ask—who was walking along, when he heard voices coming from a tree. He cut down the tree and from the trunk there emerged the Manki, the Nauti, and the Ekuti. They came out and spread about the country. The tree is said to be in the Langimar district. The Langimar is a tributary of the Watut, its banks are now occupied by the Manki, and so far as legend goes, the people appear to think of themselves as indigenous.

As regards Lord Moyne's questions about the stone implements, I have not yet had an opportunity of having my collection analysed by a geologist, but I believe that the material of a great many of them is a blue-grey slate which is brought down from the Ekuti ranges by the numerous mountain streams. It is hard, but is fairly easily cracked along lines of cleavage into shapes suitable for making into adze-heads. For club-heads, round water-worn stones are selected from the streams. I hope to publish the exact geological description of these implements at some future time.

The implements are not made by specialists. Anybody who wants one makes it for himself. There is a knack in treating the stone, but it is mostly a question, in the rough way Kukukuku implements are made, of time and patience, of both of which these people seem to have an unlimited supply. I do not think the craft is localized. As far as I know the implements are made anywhere, except that there seem to be local types.

I did not see anything of the dual-purpose adze and axe. The tools are adzes only. The Kukukuku seem to have no knowledge of the axe. In making their implements they do not use sand, but rub them on a stone, which comes to the same thing, because the grindstone is of the sandstone variety, which rubs away when used with water.

The CHAIRMAN: During the paper I wrote down a number of questions to ask Miss Blackwood, but as she comes from Oxford and is only a short way from me there I propose to go round on the first opportunity to the Pitt-Rivers Museum and get her answers there. I hope whenever any of you are in Oxford you will visit the Pitt-Rivers Museum, which to my mind is one of the most interesting of many places in Oxford and which is closely connected with our subject, geography.

I would like to pay a tribute, first of all, to the patrol officers who have done such excellent work in New Guinea; secondly, to the great courage of our lecturer. And, before closing, I would like to call your attention to a statement I recently read, that we were rapidly going back to the Stone Age. Whether we have been looking into the past or into the future I think you will agree with me that we have spent an extremely interesting evening.

PRACTICAL REGIONALISM IN ENGLAND AND WALES

E. W. GILBERT

MORE than twenty years have passed since Professor C. B. Fawcett read a paper to the Royal Geographical Society on "Natural divisions of England" (*Geogr. J.* 49 (1917) 125–44) (Fig. 2). This paper, which was later expanded into a book ('The provinces of England,' 1919), was an attempt to divide England into entirely new administrative areas which were not only larger but also more consonant with the facts of geography of the present day than the ancient counties. As will be seen from the maps, the two schemes of 1917 and 1919 differ from each other in several important details (*cf.* Figs. 2, 3). Professor Fawcett was not alone in suggesting such a radical change of our administrative system. Among other writers, Mr. G. D. H. Cole, in his book 'The future of local government' (1921), advocated a somewhat similar scheme to that proposed by Professor Fawcett (Fig. 4). Mr. Cole's arguments in favour of the changes he suggested were based largely on political and economic reasons, and his divisions were not designed to be so strictly in accordance with geography as those of Professor Fawcett. Another interesting scheme appeared in *Housing*, a publication of the Ministry of Health, in 1920. This combined a division into fifteen "provinces" with a subdivision into fifty-nine "regions." The smaller units were in fact considered to be of greater importance than the larger areas (Fig. 5). Since the paper on this subject was read to the Society, some remarkable but rather haphazard practical advances have been made towards the goal indicated by Professor Fawcett, and the time is ripe for another survey of this most important issue. In 1919 theory was ahead of practice, but at the present time practice is getting too far away from theory.[1]

The administrative divisions of this country may be grouped into three "orders." First there are the Civil Parishes, the smallest units, while the second class consists of Rural Districts which are matched by Urban Districts or Non-County Boroughs. The districts are a modern creation, but in earlier times groups of parishes were organized as "Hundreds." The third and most important units in the administrative hierarchy are the Counties with their urban counterparts, the County Boroughs. This triple system of Parish, District, County and Borough is a very ancient one and it has become unsatisfactory in several ways, but chiefly because it divorces the rural areas from the large boroughs and cities. Further, the boundaries of the counties in many places have remained unaltered for the past thousand years, and have received only slight modifications in spite of the changes in distribution of population that have taken place since the Industrial Revolution. The counties, for purposes of administration, consist of those portions of their areas that are left after the county boroughs have taken over important parts of the county's original extent. For the counties there remain the rural areas, the smaller towns, and the suburban districts that grow up immediately outside the boundaries of great cities.

[1] See "The provincial government areas in England," in *Garden Cities and Town Planning* 11 (1921) 214–8, for a comparison of the theoretical schemes mentioned.

It is becoming increasingly apparent that a new type of administrative unit is required, one that is generally larger than the existing divisions and intermediate between the local authority on the one hand and the State on the other. The rulers of these areas would be able to plan for towns and countryside at one and the same time. Such large units have not been unknown in English history. By the end of the period of the Roman occupation, Britain had been divided into five provinces. Between the seventh and ninth centuries, Anglo-Saxon England was divided into several independent kingdoms, which included Wessex, Mercia, East Anglia, and Northumbria, and although these units of the Heptarchy have long disappeared, they left a mark on English life which has never been quite obliterated by the county divisions. Later examples of this kind are provided by Cromwell's division of England and Wales into eleven districts in 1656, and by the creation of twelve military districts in 1803. During the Great War England and Wales were divided into large areas for several purposes. For example a system of eight principal divisions was adopted by the Ministries of National Service, Labour, and Munitions (Fig. 6). The main object of this paper is to describe some of the numerous schemes in which a regional plan has been adopted for various branches of organization in England and Wales, especially since 1918, and to compare the different boundaries that have been chosen. The set of maps, which have not before appeared together in one place, makes comparison easy.

It is clear that a very great stimulus to the development of regionalism in this country during the post-war period has been provided by broadcasting. The establishment of regional stations for the service of large provinces of England has given a considerable impetus to the growth of a regional consciousness, quite distinct from the old county spirit. The North Regional, Midland Regional, London Regional, West of England Regional, and Welsh Regional stations have probably done more than any other agency in fostering the growth of what may be called a new heptarchy in England and Wales. In the words of a former Director of the North Regional station, Mr. E. G. D. Living, "a new accentuation has been given to British life, in the sense that the B.B.C.'s scheme of regionalism has not only emphasized culturally the national entities of Scotland, Wales, and Northern Ireland, but has also marked out more definitely than ever before the somewhat vague entities of the English provinces themselves." In the same speech Mr. Living also claimed that the B.B.C. had restored to "the English provinces that distinctness of boundary and character that has been more apparent in some of the larger continental countries built upon a collection of neighbouring States." The early policy of the B.B.C. was to establish numerous small stations, each serving a city and its immediate neighbourhood.[1] In 1926 the B.B.C. decided to build a number of stations of high power to serve large regions. The first of these was set up in 1927 at Daventry, as an experiment, with the object of serving the Midlands. The other regional stations followed—London for the Metropolitan Region, a Northern station for industrial Lancashire and Yorkshire, a station for the thickly populated lowlands of Scotland, and one which was to serve Wales and the West Country jointly. In 1935 the Midland Regional transmitter at Daventry was replaced by the

[1] See *B.B.C. Handbook*, 1938.

Droitwich station, which has a central position in the Midlands, and a Welsh Region was formed in the same year. In 1937 the Welsh and West of England Regions, which had previously had a composite programme, were divided. In the middle of June 1939 the West of England Regional transmitter at Washford and the old urban stations at Plymouth and Bournemouth were replaced by new stations at Start Point and Clevedon (Fig. 7). It should be noted that the B.B.C. numbers among its officials a Director of Regional Relations. By means of the wireless the country has become increasingly aware of the broad provincial differences which exist within it, but the B.B.C. cannot demarcate its regional system with exact boundaries. A greater amount of precision is given by the broadcasting and publication in the newspapers of daily weather forecasts which are prepared with reference to a regional division of England and Wales into ten districts that has been adopted by the Meteorological Office of the Air Ministry (Fig. 8). It should be pointed out nevertheless that many listeners do not know in which meteorological district their home is situated, and geographical discussions on this subject often follow the broadcasting of a weather forecast! Among the many other cultural influences which have stimulated a spirit of regional consciousness, the regional newspapers, the provincial universities, and the regional novels have been the most important.[1]

The purposes for which England and Wales are at present divided by defined boundaries into regional areas may be conveniently discussed under four heads. In the first place there are the divisions made for statistical purposes of one kind or another. Secondly, there are administrative regions organized by the State for some special purpose, while a third class consists of regions which are devised by private bodies for their own needs. The last group consists of regional schemes that have been made for purposes of military and civil defence. It is only very rarely that the boundaries used by these numerous and distinct organizations coincide one with another. Let us first consider the statistical regions. These areas have no administrative reality; they are merely a convenience for the statistician and those who use statistics. Figures are provided for large regional areas, generally but not always consisting of groups of counties. The compilation of statistical material by large regions is a much more satisfactory way of presenting many classes of facts than the method of using the old county divisions. The most important and most widely used of these schemes is that devised by the Registrar-General, by which England and Wales are divided into twelve regions, if Greater London is counted as a separate region (Fig. 9). The figures for Greater London are included with those of South-East England, but are also given separately. These regions are used by the Census and by a great many official publications, and are said to have been designed in the light of economic and other characteristics of the country. The nomenclature adopted in this scheme is highly unimaginative, as the regional names adopted for the northern parts of England are North I, North II, North III, and North IV, while Wales is divided into Wales I and Wales II.

Another division and one that is commonly used to show the regional dis-

[1] See F. W. Morgan, "Three aspects of regional consciousness," *Sociological Review* 31 (1939) 68–88, for an interesting account of the regional novel.

tribution of industry is the division of England and Wales into thirteen areas, devised by the Board of Trade. This division was adopted for the Census of Production of 1935 and for this, the fifth census of its kind, the number of regions had been increased; in 1930 there were only eight areas (Fig. 1). "The specially defined areas," says the Report on the census, "were similar in both years, though some slight change of boundaries has taken place and the additional seven [including Scotland] were created by a further sub-

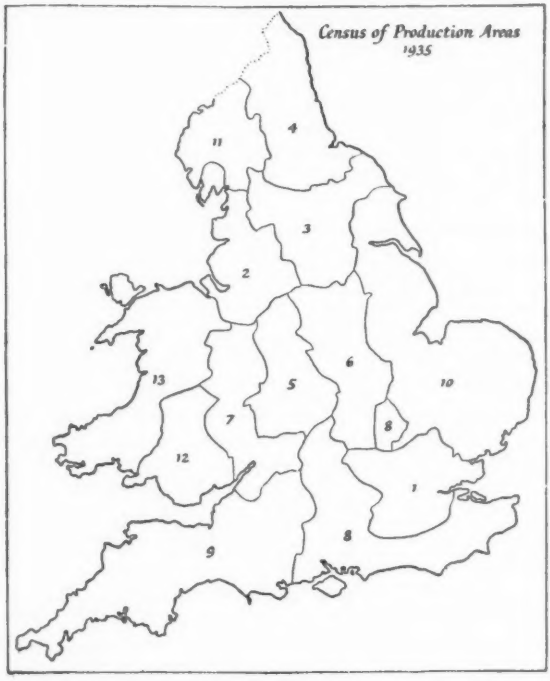


Fig. 1.—1 Greater London. 2 Lancs, Cheshire, and the Glossop and New Mills district of Derbyshire. 3 West Riding of Yorkshire (except the parts in 2 and 10) and part of the North Riding. 4 Northumberland, Durham, and the North Riding of Yorkshire (except the part in 3). 5 Warwickshire, Worcestershire, and Staffordshire. 6 East Midland. 7 West Midland. 8 South Eastern, including Kent, Beds, Oxon, Berks, Hants, and Sussex. 9 South Western. 10 Eastern. 11 Cumberland and Westmorland. 12 South Wales, including Monmouthshire. 13 Rest of Wales

division of the areas previously falling within the 'rest of England'." [1] The changes in boundaries, to which reference is made, are of considerable inconvenience to those who use the statistics and wish to compare one census with

[1] *Final report on the fifth census of production and the Import Duties Act inquiry*, 1935 (1938), p. viii.

2

8

Published by the Royal Geographical Society

3

Provinces suggested by
C. B. Fawcett in 1919
• Regional capital
NORTH
Newcastle•
ENGLAND
YORKSHIRE
•Leeds
LANCASHIRE
Manchester•
PEAKDON
Sheffield
TRENT
Nottingham
WALES
Birmingham
SEVERN
Norwich•
EAST
ANGLIA
CENTRAL
Oxford
ENGLAND
Cardiff
London
Bristol
BRISTOL
LONDON
WESSEX
Southampton
DEVON
Plymouth

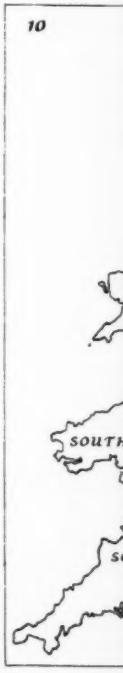
4

WEST

9

Regions used by the
Registrar-General
for the Census
NORTH
I
NORTH II
NORTH
III
NORTH
IV
MIDLAND
II
EAST
WALES
II
MIDLAND
I
WALES
I
GREATER
LONDON
SOUTH
EAST
including Greater London
SOUTH WEST

10


SOUTH

Regions suggested by G. D. H. Cole in 1921
Regional capital •
Newcastle •
NORTHUMBRIA
YORKSHIRE
• Leeds
LANCASTRIA
Manchester •
EAST MIDLANDS
• Nottingham
WEST MIDLANDS
Birmingham •
EASTERN COUNTIES
• Cambridge
WALES
Cardiff
• Bristol
WESSEX
London
METROPOLITAN
Southampton
F ENGLAND

5
Local Government Regions proposed in "Housing", 1920
NORTHUMBRIA
YORKSHIRE
LANCASTRIA
NORTH WALES
NORTH MIDLANDS
EAST ANGLIA
WEST MIDLANDS
CENTRAL & S.W. WALES
S. WALES & MONMOUTH
WYE & SEVERN
UPPER THAMES
LONDON DISTRICT
WESSEX
SOUTH EAST COAST
DEVONIA

6

Agricultural Divisions of England and Wales
These divisions are used in the statistics of the Ministry of Agriculture & Fisheries
NORTH WESTERN
NORTHERN
NORTH EASTERN
NORTH WALES
EAST MIDLAND
WEST MIDLAND
EASTERN
WALES
SOUTH EASTERN
UTH WESTERN

11
Administrative Divisions of the Employment Exchange Service (Ministry of Labour)
• Headquarters Office of Division
Newcastle •
NORTHERN
NORTH EASTERN
NORTH WESTERN
Leeds
Manchester
MIDLANDS
Birmingham
WALES
SOUTH EASTERN
London
LONDON
Cardiff
Bristol
SOUTH WESTERN

12

6

7

12

13

PRACTICAL REGIONALISM IN ENGLAND & WALES
Gilbert

14

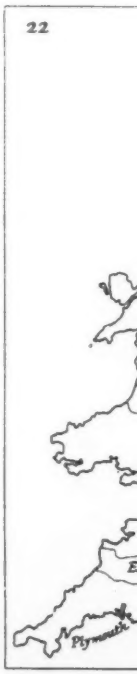
15

16

20

21

22



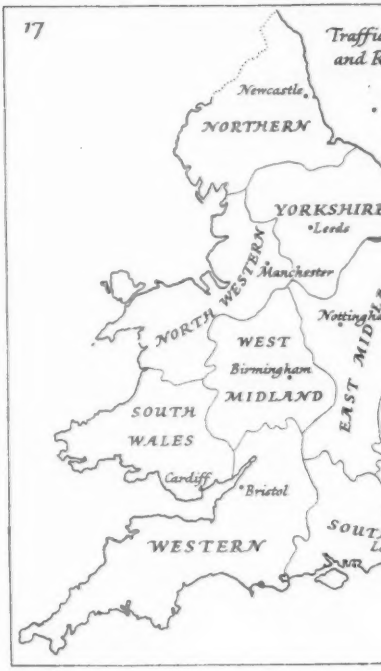
6
Traffic Areas proposed by the Royal Commission on Transport (2nd Report) in 1929
NORTHERN
YORKSHIRE
NORTH WESTERN
EAST MIDLAND
WEST MIDLAND
EASTERN
SOUTH WALES
LONDON
SOUTHERN
SOUTH EASTERN
WESTERN

17
Traffic Areas of R
and Rail Traffic
1933
• Headquarters
Newcastle
NORTHERN
YORKSHIRE
•Leeds
Manchester
NORTH WESTERN
Nottingham
EAST MIDLAND
WEST
MIDLAND
Birmingham
EASTE
•Cambrid
SOUTH
WALES
Cardiff
•Bristol
METRO-
POLITAN
London
S.W.1
SOUTH EASTER
London S.W.1
WESTERN

22
Telephone Areas
• Headquarters
Newcastle on-Tyne
Middlesbrough
Lancaster
Preston
Bradford
Blackburn
York
Leeds
Liverpool
Manchester
Sheffield
Lincoln
Chester
Nottingham
Stoke on Trent
Shrewsbury
Leicester
Peterborough
Norwich
Birmingham
Coventry
Cambridge
Bedford
Colchester
Gloucester
Oxford
Swansea
Cardiff
London Postal & Telecom. Regions
Southend on-Sea
Reading
Bristol
Canterbury
Guildford
Tunbridge Wells
Taunton
Southampton
Brighton
Exeter
Bournemouth
Portsmouth
Plymouth

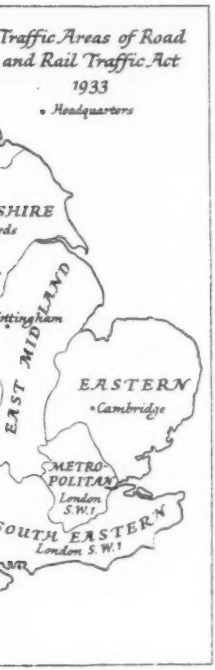
23
Districts of t
Major-General
1656 (after S.R.Ga
Sub-division
City of London - S
Middlesex - Ba
LAMBERT
WORSLEY
WHALLEY
BERRY
BUTLER
FLEETWOO
M
LONDON
KELSEY
GOUGH
DESBOROUGH

Traffic Areas proposed by the Royal Commission on Transport (2nd Report) in 1929
NORTHERN
YORKSHIRE
WESTERN
EAST
WEST MIDLAND
MIDLAND
EASTERN
LONDON
SOUTHERN
SOUTH EASTERN

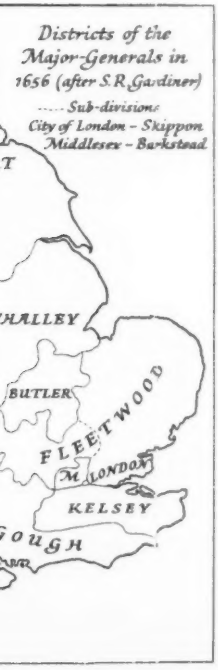

17
Newcastle
NORTHERN
YORKSHIRE
Leeds
Manchester
NORTH WESTERN
WEST MIDLAND
Birmingham
SOUTH WALES
Cardiff
Bristol
WESTERN

Telephone Areas
• Headquarters
Newcastle on-Tyne
Middlesbrough
York
Bradford
Blackburn
Leeds
Manchester
Sheffield
Lincoln
Stoke on Trent
Nottingham
Leicester
Peterborough
Norwich
Birmingham
Coventry
Cambridge
Bedford
Colchester
Gloucester
Oxford
London Postal & Telecom. Regions
Southend on-Sea
Bristol
Reading
Canterbury
Guildford
Tunbridge Wells
Southampton
Brighton
Bournemouth
Portsmouth

23
LAMBERT
WORSLEY
BERRY
DESBOROUGH


Traffic Areas of Road and Rail Traffic Act 1933
• Headquarters
SHIRE
EAST MIDLAND
EASTERN
• Cambridge
METRO-POLITAN
London S.W.1
SOUTH EASTERN
London S.W.1

18
Areas of the Automobile Association
• Headquarters
The Home Area is sub-divided with offices at Chelmsford, Maidstone, Guildford, Brighton, and Southampton
NORTHUMBERLAND & DURHAM
Newcastle
NORTH WESTERN
NORTH EASTERN
• Leeds
Liverpool
Manchester
EAST MIDLAND
Nottingham
LIVERPOOL & N. WALES
MIDLAND
Birmingham
Norwich
EASTERN
SOUTH WALES
Cardiff
SOUTH MIDLAND
Reading
Bristol
London
WESTERN
HOME
CORNWALL & DEVON
Exeter


Districts of the Major-Generals in 1656 (after S.R. Gardiner)
..... Sub-divisions
City of London – Skippon
Middlesex – Barkstead
HALLEY
BUTLER
FLEETWOOD
M. LONDON
KELSEY
OUGH

24
Military Districts of 1803
NORTHERN
YORK
NORTH WEST
NORTH INLAND
EASTERN
SEVERN
SOUTH INLAND
HOME
HOME
LONDON
SOUTH WEST
SOUTHERN
WESTERN

18

Areas of the Automobile Association
• Headquarters
The Home Area is subdivided with offices at Chelmsford, Maidstone, Guildford, Brighton, and Southampton.
NORTHUMBERLAND & DURHAM
Newcastle
NORTH EASTERN
Leeds
NORTH WESTERN
Manchester
Liverpool
LIVERPOOL & N. WALES
EAST MIDLAND
Nottingham
MIDLAND
Birmingham
Norwich
EASTERN
SOUTH WALES
Cardiff
Bristol
SOUTH MIDLAND
Reading
London
WESTERN
HOME
CORNWALL & DEVON
Exeter

19

24

Military Districts of 1803
NORTHERN
YORK
NORTH WEST
NORTH INLAND
EASTERN
SEVERN
SOUTH INLAND
HOME
HOME
LONDON
SOUTH WEST
SOUTHERN
WESTERN

25

Sales Areas of a Chocolate Firm with a National Distribution
• Headquarters
Newcastle
Leeds
Liverpool
Manchester
Sheffield
Chester
Birmingham
Leicester
Cambridge
Cardiff
Bristol
North London
South London
Southampton
Brighton
Exeter

Civil Defence Regions
1939
• Regional Headquarters
Newcastle
NORTHERN
NORTH WESTERN
NORTH EASTERN
Leeds
Manchester
NORTH MIDLAND
Nottingham
MIDLAND
Birmingham
WALES
EASTERN
Cambridge
Cardiff
Bristol
Reading
LONDON
London
SOUTHERN
Tunbridge Wells
SOUTH EASTERN
SOUTH WESTERN

another. The Licensing Statistics are arranged on another and quite a different regional plan. Twelve areas have been adopted, and the convictions for drunkenness are tabulated for each area, which consists of a number of counties that have been "grouped mainly on an occupational basis." [1]

Agricultural statistics have long been prepared by regions as well as by counties (Fig. 10). England and Wales are at present divided into ten agricultural divisions for the presentation of these statistics. In 1894 exactly the same eight regional divisions were used for England, but Wales was then treated as one division instead of two as at present.

The second purpose for which regional divisions are used may be described as administrative. England and Wales are divided into regional areas for many different branches of public administration. For example the Employment Exchange Service of the Ministry of Labour is divided into eight territorial units (Fig. 11, which should be compared with Fig. 6). Each division is in charge of a Divisional Controller who has his headquarters in the town which may be described as the regional capital of the area. These divisions are Northern, North Eastern, North Western, Midlands, Wales, South Western, London and South Eastern, while the administrative centres are Newcastle, Leeds, Manchester, Birmingham, Cardiff, Bristol, and London (for London and South Eastern) respectively.

The High Court of Justice is a much older branch of administration, and part of its work has been regionalized for centuries past and is now divided into eight circuits. These are the South Eastern, Midland, Oxford, Northern, North Eastern, Western, North Wales, and South Wales circuits.[2] In each circuit there are between four and ten assize towns, and the fact that a town is chosen as a seat for the judges gives it considerable prestige and importance in its region.

Some of the great public utilities are now organized on a regional basis, and it is in this field that important changes have taken place in post-war years. By an Act of Parliament of 1926, a Central Electricity Board, a national organization, was created. The construction of the grid began in Scotland in 1928 and the last tower was built in Hampshire in 1933. At the same time Great Britain was being divided into regional areas and each area adopted a scheme (Fig. 12). The first scheme was that of Central Scotland, which was started in 1927, and the last division to receive its scheme was South Scotland in 1931. The ten "scheme areas" of the Central Electricity Board, of which seven are in England and Wales, are said to have been selected on the basis of the economic characteristics of each region.

In 1929 the Royal Commission on Transport in their Second Report recommended that the country be divided into Traffic Areas (Fig. 16). The Commission stated that they were "in complete agreement with the principle of large traffic areas—indeed we fail to see any other practical and satisfactory alternative." [3] The Commissioners drew up a scheme of boundaries for the eleven areas into which they suggested England and Wales should be divided. This division differed in many respects from the boundaries of "Traffic

[1] *Licensing statistics* (1934).
[2] *Civil judicial statistics*.
[3] *Royal Commission on Transport*. Second Report (1929), p. 25.

Areas" which were set up by the Road Traffic Act of 1930 and subsequent Acts such as the Road and Rail Traffic Act of 1933 (Fig. 17). In the first place the number of the areas was reduced from eleven to ten, the Southern area of the Commissioners being eliminated, and secondly the boundaries of the regions themselves were altered in many important particulars. Regional capitals were again created as centres of traffic administration for each area.

The Post Office has been completely reorganized on a regional basis during the last few years. In 1932, after a considerable amount of adverse criticism of the methods of the Post Office had been ventilated in *The Times*, a committee was set up under Lord Bridgeman to investigate the alleged defects. This committee came to the conclusion that too much authority was centralized at headquarters in London, and suggested that the country be divided into regions and that the control of all postal services in each region be placed under a regional director. A departmental committee was then appointed under Sir Thomas Gardner, and this body reported in favour of the regionalization of the Post Office more or less on the lines laid down by the Bridgeman Committee. The Gardner Committee supported the proposal that regional directors be appointed and that these men, assisted by boards, should control the various Post Office services over wide areas. The committee came to the conclusion that the efficiency of the Post Office would be considerably increased if this measure of decentralization was adopted. In 1936 two regions were set up as an experiment, one covering all Scotland with headquarters in Edinburgh, and the North Eastern Region with headquarters at Leeds. Later in the same year London became a region, a postal and telecommunications region. Thus another London—a London of 234 square miles—was created. The whole experiment was so successful that the Postmaster-General was able to announce, early in 1938, that the three regions already set up were to be made permanent and, further, that the whole organization of the Post Office was to be regionalized on the basis of eight regions including Scotland. "At the headquarters of each region," said Major Tryon, "will be assembled the chief officers responsible for the various services—postal telegraphs, telephones, staff control, finance, etc. These, with the director and his deputy, will form the Regional Board. The director, aided by his board, will make decisions without reference (except in a few reserved matters) to headquarters in London, and thus delay is avoided, and each development, such as an extension of the service, will be dealt with by men who are in close and constant touch with local needs and local atmosphere, as well as with the general policy of the department, and will thus be able to make swift decisions." The seven Post Office regions are named North Western, North Eastern, Welsh and Border Counties, Midland, South Western, Home Counties and London (Fig. 13). One of the practical difficulties that faced the Gardner Committee was the choice between the small and the large region. "If a region were too large there was some risk that the regional director could not exercise proper control, for the reason that the very size of the region would prevent sufficiently close touch with the officers in charge of the local units. On the other hand, too small a regional unit would render somewhat expensive the provision of a

full range of functional staff without which the fullest measure of decentralization could not be envisaged." [1]

The Gardner Committee recommended the creation of telephone areas, and this plan was also adopted (Fig. 22). These are smaller in size than the Post Office regions, and the number eventually chosen was forty-six. These areas are in fact subdivisions of the Post Office regions, and much research was carried out to ensure that the boundaries might be co-terminous. For instance the North Eastern region was divided into seven telephone areas. The telephone areas range between Peterborough, Taunton, and Shrewsbury, all of which have about ten thousand exchange lines, and Manchester or Birmingham with more than eighty thousand lines apiece. These subdivisions and their capitals, or area headquarters, are of considerable interest to geographers, as they approximate in size to the old counties, but are more in accordance with the geographical conditions of the present day; the choice of the capital in each case is of special significance. Before this scheme came into operation the telephones had been organized on a basis of twenty-six district managers' areas, which were considered to be too large. The 450 head postmasters' areas were obviously too small, and a solution intermediate between the two had to be found by constructing new areas.

For the purpose of assisting agriculture, England and Wales (except the County of London) are now divided into thirteen advisory provinces (Fig. 14, compare with Fig. 10 showing the regions for agricultural statistics). Each of these regions has an advisory centre (there are two in the North West province), and at each of these places a body of between three and seven advisory officers is stationed.[2] The centres are all placed at agricultural colleges or university departments of agriculture. As these regions have been arranged round the existing centres, some of them have rather an odd shape, as will be seen by an examination of the map. The Southern province as here defined is a geographical curiosity and does not appear to possess any well-marked *raison d'être*.

In 1933 a commission which had been investigating the milk industry brought out a scheme for its reorganization, and its general proposals passed into law. Under this scheme England and Wales were divided into the eleven regions of the Milk Marketing Board (Fig. 15, which may be compared with Fig. 10). In each region a separate pool price of milk is fixed. "This is the price which the farmer actually gets for his milk, however he has sold it, to whatever use the milk is put, and whatever price the buyer pays for it. The pool price is determined for each region by adding together the total receipts for the sale of milk from the region, together with contributions from the producer-retailers, the Government cheese subsidy, and the proceeds of the 'inter-regional compensation fund'." [3] The Milk Board is formed of representatives from each region with the addition of some other persons. The regions are said to fall into three main groups. The four regions in the south-

[1] D. J. Lidbury, *Post Office regionalisation* (Post Office Green Papers, No. 34, 1937), p. 6. See also E. T. Crutchley, *G.P.O.* (1938), p. 236.

[2] See *Report on agricultural research in Great Britain* (P. E. P. Report) (1938).

[3] Viscount Astor and B. Seebohm Rowntree, 'British agriculture' (1938), p. 277. See also 'Milk Marketing Scheme: five years review, 1933–38' (1939).

east are more interested in liquid milk, while the five regions of the south and west are more concerned with "manufacturing" milk, and the two northern regions are not so specialized. The nomenclature of the milk regions almost recalls America, and it will interest geographers to learn of the existence of a Mid-Western region and a Far-Western region in this country. The Mid-Western region lies directly south of the West Midland region.

Two other post-war organizations may be mentioned as examples of regionalization, but in both cases the areas adopted are smaller and consequently more numerous than in most of the other systems described. By an Act of 1930, catchment boards were established, each with control over the water of a given area. There are forty-nine such areas in England and Wales, and between them they include most of the country. The other organization was one set up under the Physical Training and Recreation Act of 1937, by which twenty-two regional committees were started. The regional organization of the Church of England into the Provinces of Canterbury and York, and a subdivision into forty-three dioceses is another example of a system that is more akin to the county system (Fig. 21). Eighteen of the English dioceses are of ancient foundation, most of them going back to Saxon times. There are forty-one counties in England, if the subdivisions of certain counties like Yorkshire and Sussex are not taken into consideration. Wales is divided into twelve counties, but the Province of the Church in Wales has only six dioceses (Figs. 20, 21). Thus in the case of counties, telephone areas, catchment boards, and dioceses we find that the number of administrative divisions exceeds forty in every case (*cf.* Figs. 20, 21, 22).

The third class of regional division is one set up by some private organization and not in any way controlled by the State. The Automobile Association, for example, says that "in the interests of members decentralization has been adopted. Great Britain and Ireland are divided into areas, each in charge of a secretary who is a practical motorist, fully conversant with motoring conditions in the area." [1] Twelve areas have been adopted for England and Wales, each with its area headquarters (Fig. 18, which should be compared with Fig. 17, showing traffic areas). Many business firms with national distributions divide the country into sales areas purely for their own purposes. For example, one well-known chocolate firm uses sixteen regions, each with a headquarters (Fig. 19). These are only two examples out of many which could be obtained; for instance the divisions adopted by the trades unions are not without interest.

The regional divisions for purposes of defence have always been of great importance in the past, but they are of even greater significance at the present day in view of the possibility of aerial attack. Both in the past and at the present time a division of England and Wales into about a dozen regions has proved to be a more useful means of organization for defence than one based on the fifty-three counties. In 1656 Cromwell divided the country into eleven districts (with a few subdivisions), each governed by a major-general (Fig. 23). This method of government, which was concerned with defence against enemies within the State rather than against foreign foes, was exceedingly unpopular and involved many serious encroachments on the constitution.

[1] *A.A. Hotel Handbook* 1938–39, p. 4.

This system was a new form of local government, by which special taxes were collected and Puritan morals were promoted. In November 1803, according to a map published at that date by J. Fairburn, England and Wales were again divided into military districts, this time twelve in number (Fig. 24). An invasion by the forces of Napoleon was anxiously awaited, and a regional organization was adopted to meet any emergency. In addition to the twelve districts of England and Wales, Scotland, Ireland, Guernsey, and Jersey were constituted as four separate regions. There are several points of interest in this scheme. The nomenclature adopted for the regions is attractive, including as it does the "North Inland," "South Inland," and "Severn" districts. The last-named comprised "the county of Gloucester and its vicinity of Bristol, viz. Bath, Trowbridge, Bradford, Wells, Axbridge, or other places occupied by detachments from Bristol; Worcester, Hereford, Monmouth, and South Wales." This region was primarily designed with a view to the possibility of the use of the Severn estuary by an invading enemy. The London district included "London and Westminster, the Tower Hamlets, Rotherhithe, Lambeth, and those parts of Middlesex and Surrey within the Bills of Mortality," while the Home district consisted of Middlesex, exclusive of London and other parts appropriated to the London district, and the counties of Hertford and Berks.

At the present day England and Wales are divided into six army "Commands," and presumably the country is also divided into regions by the R.A.F. But of greater importance for the internal organization of the country was the announcement made by Sir John Anderson, at the beginning of February 1939, that England and Wales would be divided into eleven Civil Defence regions in any future war, and that Scotland would form a twelfth region (Fig. 25). It was stated that each region would be in charge of a Regional Commissioner, who was to be appointed in peace time, and was to have the assistance of a Deputy Commissioner and a war staff. Regional officers for Air Raid Precautions had existed for some time previously. The staff of the regional commissioner, in the words of Sir John Anderson, will consist of "A.R.P. regional officers who will have been at work in time of peace, representatives of all government departments concerned with civil defence such as the Ministry of Health, the Ministry of Transport, and the Food (Defence Plans) Department, thus linking the regional organization with the existing machinery of government." As in 1655 and in 1803, so to-day London has to be treated as a separate region. "Its boundaries," said Sir John Anderson, "will be those of the Metropolitan Police Area. Such a complex and densely populated area has many problems which require special treatment, and the machinery of a typical region would not meet the case." Later it was decided that the regional commissioner for London should be assisted by two deputy commissioners instead of one. The proposed system at first received a good deal of criticism; the twelve regional commissioners were described as "dictators," and the obvious but unpleasant comparison with Cromwell's eleven major-generals was made. The South West Civil Defence region is identical with Desborough's district in Cromwell's scheme, and there are other similarities (*cf.* Figs. 23, 25). The number of the "dictators" originally proposed for England and Wales is the same in

1939 as in 1656, namely eleven. These misgivings were answered by Sir John Anderson in a speech made in the House of Commons on 1 March 1939, in the following words: "The purpose of the regional organization which is being planned for war-time, linking up with the peace-time regional organization, is simply to guard against a contingency, which it would be utter folly to ignore, of communications between various parts of the country and the headquarters of government being interrupted by war operations. It had seemed to the Government necessary, in order to guard effectively against that contingency, to make provision for the setting up in convenient centres of an organization which could, if necessary, and to the extent necessary, replace His Majesty's Government for the purpose of giving effective decisions in matters of immediate urgency." This statement shows very plainly the importance of a scientifically planned regional division of the country in time of war. It is clear that in devising the Civil Defence regions, the boundaries of the traffic areas must have been borne in mind, but there are some important differences, as several regions that are not traffic areas have been created. The names of the Civil Defence regions are of much geographic interest. A Southern region with its capital at Reading is included in this new organization, and it should be noted that a Southern region or a Wessex had been proposed in the theoretical schemes of Fawcett and Cole. It seems strange that a region of this type had been disregarded in most of the practical systems described in this paper. The Civil Defence scheme adds another specimen to the collection of strange regional nomenclature with its "North Midland" region.

An important issue which arises from a study of regionalism is the influence of the regional capital. In the United States the significance of what has been called "Metropolitan Regionalism" has been clearly recognized, and it is believed that certain American cities are gradually gaining more control over immense regions which surround them.[1] In the preceding account of regional administrative organizations in England and Wales, attention has been called to the fact that in many of the schemes a regional headquarters has been selected for each area. The regions differ in number and in their boundaries for each scheme, and the capitals chosen also show a certain amount of variation. Nevertheless there are several towns that are listed in nearly every scheme, and we can see that the process of "Metropolitan Regionalism" which has been observed in the United States is also taking place in England and Wales. The regional capitals of the schemes discussed are tabulated opposite, in three main groups: theoretical, administrative, and privately organized.

London, Birmingham, Manchester, Leeds, Bristol, and Cardiff appear in every list in the table; Newcastle is in all except one. Thus we find that these seven towns are clearly admitted to be the metropolitan centres of a new heptarchy—the regions of Greater London, the Midlands, Lancastria, Yorkshire, the West Country, Wales, and the North-East. When Cardiff had been selected as the capital of the Civil Defence region of Wales, Sir H. Morris-Jones asked Sir John Anderson whether he would "consider the geographical difficulties of administration in Wales from a headquarters at Cardiff," and

[1] See for example H. W. Odum and H. E. Moore, 'American regionalism' (1938), chapter V, "Metropolitan regionalism."

CAPITALS OR ADMINISTRATIVE HEADQUARTERS CHOSEN IN REGIONAL SCHEMES

Complete list of all towns selected in these schemes as regional capitals, in order of size.	THEORETICAL SCHEMES			ADMINISTRATIVE SCHEMES ORGANIZED BY THE STATE				SCHEMES ORGANIZED BY PRIVATE BODIES	
	Capitals of C. B. Fawcett 1917	*Capitals of C. B. Fawcett* 1919	*Capitals of G. D. H. Cole* 1921	*Headquarters of Employment Exchange Service*	*Headquarters of Traffic Areas*	*Headquarters of P.O. Regions*	*Headquarters of Civil Defence Regions*	*Headquarters of A.A. Areas*	*Headquarters of Sales Areas of a Chocolate Firm*
	Fig. 2	*Fig.* 3	*Fig.* 4	*Fig.* 11	*Fig.* 17	*Fig.* 13	*Fig.* 25	*Fig.* 18	*Fig.* 19
London	London	London	London	London (twice)	London (twice)	London (twice)	London	London	London (twice)
Birmingham	Birmingham	Birmingham	Birmingham	Birmingham	Birmingham	Birmingham	Birmingham	Birmingham	Birmingham
Liverpool	—	—	—	—	—	—	—	Liverpool	Liverpool
Manchester	Manchester	Manchester	Manchester	Manchester	Manchester	Manchester	Manchester	Manchester	Manchester
Sheffield	—	Sheffield	—	—	—	—	—	—	Sheffield
Leeds	Leeds	Leeds	Leeds	Leeds	Leeds	Leeds	Leeds	Leeds	Leeds
Bristol	Bristol	Bristol	Bristol	Bristol	Bristol	Bristol	Bristol	Bristol	Bristol
Newcastle	Newcastle	Newcastle	Newcastle	Newcastle	Newcastle	—	Newcastle	Newcastle	Newcastle
Nottingham	Nottingham	Nottingham	Nottingham	—	Nottingham	—	Nottingham	Nottingham	—
Leicester	—	—	—	—	—	—	—	—	Leicester
Cardiff	Cardiff	Cardiff	Cardiff	Cardiff	Cardiff	Cardiff	Cardiff	Cardiff	Cardiff
Plymouth	Plymouth	Plymouth	—	—	—	—	—	—	—
Southampton	Southampton	Southampton	Southampton	—	—	—	—	—	Southampton
Brighton	—	—	—	—	—	—	—	—	Brighton
Norwich	—	Norwich	—	—	—	—	—	Norwich	—
Reading	—	—	—	—	—	—	Reading	Reading	—
Oxford	Oxford	Oxford	—	—	—	—	—	—	—
Cambridge	Cambridge	—	Cambridge	—	Cambridge	—	Cambridge	—	Cambridge
Exeter	—	—	—	—	—	—	—	Exeter	Exeter
Chester	—	—	—	—	—	—	—	—	Chester
Tunbridge Wells	—	—	—	—	—	—	Tunbridge Wells	—	—
Total 21	12+1 undecided	13	10	8	10	7	11	12	16

the Lord Privy Seal replied that certain government departments would open sub-regional offices at Caernarvon, in order to simplify the administration. The difficulty of finding a suitable capital for Wales has always existed, and it has been facetiously suggested that the most suitable alternatives are Shrewsbury and the Paddington Hotel! Shrewsbury was the headquarters of Cromwell's major-general, James Berry, who ruled Wales with the four counties of Shropshire, Hereford, Worcester, and Monmouth. Nottingham is in every list except three, and may be regarded as the capital of the East Midlands, when such a subdivision of the Midlands is considered necessary. It will be noticed that the great cities of Liverpool and Sheffield do not appear in any of the administrative schemes of the State, as they are too close to the capitals of Manchester and Leeds respectively. Sheffield was chosen as the capital of "Peakdon" in Professor Fawcett's second theoretical scheme, but this region has never been officially adopted. The great size and importance of Liverpool and Sheffield sometimes compel a business organization to use them as headquarters; this is made clear by the fact that both these towns appear in the list of headquarters of sales areas. It is noteworthy that the names of five of the twelve large clearing-house centres of the banks, whose statistics are regularly quoted in the *Economist*, scarcely appear in the table. These places are Liverpool, Sheffield, Bradford, Hull, and Leicester.

The eight towns which appear in nearly all the lists may be described as centres of what are (with the exception of the West Country) primarily industrial areas. The division of the remainder of England, which is less densely populated and whose interests are more agricultural, is difficult. As will be seen by an examination of the maps, the regions chosen in the various schemes differ very considerably, and the towns selected as capitals also vary. The most clearly marked region is East Anglia, which appears—admittedly in a slightly different form—in nearly all the schemes described. The obvious capital of this area would seem, at first sight, to be Norwich, a city which proudly regards itself as the "heart of East Anglia," and yet the much smaller town of Cambridge appears more frequently in the table. Cambridge is the capital of two out of the four official administrative schemes included in the table—namely for traffic and for civil defence. Cambridge was selected by Professor Fawcett in 1917 and by Mr. Cole, but Professor Fawcett in 1919 changed his capital of the area to Norwich. In the discussion after Professor Fawcett's paper Mr. Hinks had remarked that Norwich is a "sounder capital than Cambridge could possibly be for the province of East Anglia" (*Geogr. J.* 49 (1917) 138).

The south-west, which is usually chosen as one region with Bristol as its capital, is unduly large, and if a subdivision is attempted with Devon and Cornwall combined as a separate region, then Plymouth or Exeter appears as a capital. It seems surprising that this subdivision has not been used in the Civil Defence scheme, as Bristol is not very central for the West Country as a whole, and the numerous small ports of this region would be of fundamental importance in a future war. The south-east of England is generally grouped with London, but if it is given a separate regional existence it is exceedingly difficult to name a capital. Brighton is the largest town, but is more in the nature of a seaside suburb of London than a regional capital. Professor

Fawcett was unable to name a suitable capital, but Sir John Anderson has made the remarkably curious choice of Tunbridge Wells as centre of the South-East Civil Defence region. The reason for its selection may lie in the fact that it is the centre of one of the telephone areas in the region. The south-east is so intimately bound up with London that in the three other official administrative schemes in the table London is the capital twice over, first for London and secondly for the south-east.

As has been pointed out, the theoretical Southern region with a capital at either Southampton or Reading is rarely chosen for practical administration. Again, Professor Fawcett's Central England with a capital at Oxford appears in his two lists and in no other scheme. This is very surprising, as the area has considerable geographical coherence and is sometimes known to geographers as the South-East Midlands,[1] and its regional capital of Oxford possesses a remarkable degree of nodality in the network of roads and railways of the country. This natural nodality has facilitated its recent growth. The city is situated at about the same distance (60–70 miles) from the three ports of London, Bristol, and Southampton, and from the industrial area of Birmingham. The central position of Oxford, not only in the Upper Thames basin, but also in the south of England as a whole, makes it a possible alternative to London as a national capital.

In 1915, Professor Patrick Geddes, after describing seven of the most densely populated areas in England and Wales, said that "a New Heptarchy" had grown up "naturally, yet almost unconsciously to politicians," beneath the existing political and administrative network. He claimed that a new form of organization would be built up to meet these problems, which could not be left entirely in the hands of town and county councils.[2] As has been shown in this paper, Professor Geddes' forecast is coming true and regionalism is being put into practice by politicians to an increasing degree. This process is likely to go further, as it appears to be favoured by members of both of the leading political parties. For example, on 22 February 1939 in the House of Commons, Mr. Emery, a Conservative Member for a Salford division, is reported to have said "that the whole country, and not the black spots only, should be divided into areas, with selected men in control even with plenary powers if necessary, and it should have subdivisions into regional districts in close contact with the Ministry of Labour, industrialists, local authorities, and trade unions. The commissions would be able to survey the whole industrial prospects of each district and the position and types of labour available." Again, on 13 March 1939, Mr. Shinwell, the Labour Member for Seaham, is said to have remarked that "the question arises as to whether there is any longer any justification for keeping up the pretence that there is any essential difference between the so-called Special Areas and the areas not so designated. . . . The boundaries ought to be swept away at the earliest opportunity, and some form of regional organization established, working in conjunction with the local authorities under the supervision of some government department, with power to act promptly when an area

[1] See A. G. Ogilvie (Ed.), 'Great Britain' (1928), in which chapter VII, by H. O. Beckit, is called "The South-East Midlands."

[2] P. Geddes, 'Cities in evolution' (1915), pp. 41–2.

is suddenly overwhelmed by a wave of depression, and also to deal with normal unemployment." These are but two examples of many speeches on the same lines.

A report of a Royal Commission on Tyneside [1] outlined a scheme for a new system of local government on a regional basis for certain services. It was proposed that the services of Public Health, Education, Public Assistance, Police, Fire Brigade, and Highways should all be administered regionally, but the recommendations of the report were rejected by the then Minister of Health, Sir Kingsley Wood. The possibility of establishing a regional authority for Merseyside has often been proposed, and there is much literature on the subject.[2] A regional organization is being urged as a solution of many problems, and such a system is being strongly advocated for hospitals and for all branches of the medical services. The library services of the country have been regionalized, and it is felt that a similar plan could be carried out for hospitals. The possibility of grouping all the hospitals in each region round a central or base hospital and thus developing the hospital services of the region as a whole is being constantly considered. The effective supply of hospital and specialist medical services has no relationship at all to present local government boundaries. Another field which would be greatly benefited by a regional organization is technical education. In Yorkshire there are fifteen autonomous and separate authorities for technical education, but these authorities have cooperated on a voluntary basis so as to provide an efficient and economical system of technical education for Yorkshire as a whole. Similar steps have been taken in South Wales and in the West Midlands, but regional cooperation of this kind is badly needed in all parts of the country. It should be abundantly clear that regional schemes are being considered in almost every phase of English life, and it is possible that far-reaching reforms in our methods of local government may soon be made. Regional areas larger than the existing units of administration may be established, and by such reform government would be consolidated, overlapping and waste of effort and money would be prevented, and greater efficiency would be promoted.

An attempt has now been made to give an account of certain aspects of the administrative geography of the country. In addition to this catalogue of the facts, a few positive suggestions must be brought forward. Three main conclusions can be drawn from this brief survey of the subject. In the first place, it is essential that a uniform system of regions be devised for the country as a whole, and that these areas be used for as many functions as possible. At the present moment a different regional plan is brought into being for each need, and the areas chosen never coincide with each other. Careful comparison of the set of maps shows that many striking absurdities exist, and that there is almost a complete lack of coordination between the different schemes. After a thorough geographical survey about a dozen regions should be fixed and in each regional capital a representative body should be estab-

[1] *Report of the Royal Commission on Local Government in the Tyneside Area.* (1937. Cmd. 5402.)

[2] See for example W. G. Holford and W. A. Eden, 'The future of Merseyside' (1937), and T. S. Simey, 'Local government on Merseyside' (1933).

lished with very considerable powers over the region as a whole. For instance, these bodies should control the planning of their respective regions, and they would be much more effective in such matters as ribbon development and town-planning than the present local authorities. It should be noted that since 1936 Germany has been divided into twenty-three planning regions, each with a body that has full power to evolve a comprehensive regional plan.[1] The objection will certainly be raised that every activity should not be compelled to conform to the same boundaries. It is however very desirable that the same number of regions be adopted and that their boundaries be standardized as far as is possible, slight deviations for special purposes to be allowed, where this is essential. Unless a standard scheme is adopted, it will become more difficult to foster a new local regional patriotism in each area.

It will be useful at this point to consider the minor divisions of the country. In a social survey [2] that has been recently published a series of seventeen maps was prepared to show the different minor areas of administration for a number of public services such as District Valuation, Employment Exchanges, Income Tax Commissioners' Divisions, Electoral Divisions, Postal Areas, etc., which exist in the district immediately surrounding Oxford. The areas are different in almost every case and the differences give rise to many inconveniences. What may be called the micro-political geography of our country is indescribably complex. In creating new major provincial regions it is to be hoped that the errors made in constructing the minor units will be avoided, and that the *same* major unit will be adopted for as many administrative purposes as is possible. Some sort of uniformity ought to be established on the basis of geography. It is not always realized that British geographers are accustomed to handle material of the kind described in this paper as part of their daily work, and they could perform a useful task by bringing forward an ideal and practical scheme of regions for general adoption in this country. It is not the purpose of this paper to produce such a scheme, which could best be evolved by cooperation of those geographers and administrators especially interested in the subject.

In the second place it is recommended that uniform economic regions should be created primarily for statistical purposes. Such regions exist in France,[3] and they would be of great value in this country. The present state of confusion in which different areas are adopted for different classes of statistics and are, in some cases, changed at subsequent censuses should be abolished. Economic regions might possibly be created as subdivision of the new major regional provinces, with their boundaries co-terminous with each other. This coordinated arrangement of statistics would be an immense help to the user of statistics and to the governors of the major regions. At the present time, comparison of one set of statistics with another is an extra-

[1] "The economic regions of Germany," R. E. Dickinson. *Geogr. Rev.* 28 (1938) 609–26, contains a map of the new regional planning districts and of other German administrative divisions.

[2] 'A survey of the social services in the Oxford district' (1938), vol. I, Appendix VII, 315–46.

[3] See *Atlas de France* (pub. by Comité National de Géographie), plate 79, for a map of the economic regions. These twenty regions were set up by the Ministry of Commerce and were complete by about 1920.

ordinarily difficult process. It is worth noting that an American writer, Professor E. G. Mears, in a recent number of the *Geographical Review*, has called attention to the difficulty of interpreting and comparing British statistical information, because of the lack of uniformity in the regions used.[1]

Thirdly, and lastly, it is suggested that the Royal Geographical Society might profitably turn its attention to the selection and standardization of the regional names adopted. The Society has always interested itself in the proper selection of place-names and its influence in the choice of nomenclature in remote parts of the world has been wholly good. It would be a great advantage if the Society could bring pressure to bear on the choice of regional names in the home country, and if it could ban such names as Mid-East, Mid-West, Far-West, North I, North II, North III, and North IV. Satisfactory and pleasant-sounding regional names such as East Anglia, the West Country, and Wessex are only waiting to be used. Further, the Society could standardize the meaning of such terms as "Midland" and "North-East," which at present connote entirely different areas in different schemes.

In the early part of the century the late Professor Herbertson, by his activities at Oxford, placed the study of regional geography in the forefront of geographical work in British universities. The influence of this school of thought has been extended by Herbertson's pupils, and has been considerable. Even the Government has been affected, perhaps unconsciously, by this new Oxford movement. Nevertheless, the national and local administrators of this country so far have translated geographical theories into action in a haphazard fashion, with no attempt at coordination and with little understanding of the geographical facts involved. The growth of a regional system of government would eventually result in the creation of a healthy regional spirit and a pride similar to that engendered by the old counties. This is a factor which would be of immeasurable value in re-planning Britain in times of peace and is essential for facing the ordeal of war. It is the earnest plea of the writer that professional geographers will use all their endeavours to ensure that the foundations of the regional system of administration are coordinated on a sound geographical basis, for in this way their work will enrich the life of the nation.

[1] E. G. Mears. "Post-war locational changes of British industry," *Geogr. Rev.* 29 (1939) 241.

GEOGRAPHICAL NAMES IN SOUTH AFRICA

THE problem of establishing the modern orthography of South African names is extraordinarily complicated and interesting. Scholarly work has been done on place-names, particularly by C. G. Botha, J. R. L. Kingon, and C. Pettman, but there is no generally recognized official authority on geographical names. In both official and popular usage alternative forms such as Cape Town—Capetown, King William's Town—Kingwilliamstown, Oos-Londen—Oos Londen, Paarl—Perel, Stellenbosch—Stellenbos, Suid-Afrika—Suid Afrika, Cape Recife—Cape Receiffe, etc., jostle each other for ascendency. On the best available map of the Union (Topographical Map of the Union of South Africa, 2/M, 10 sheets, Director of Irrigation, Pretoria, 1936–37) a number of difficulties of nomenclature have been resolved, though not with regularity. Owing to the uncertainty prevailing, particularly with respect to the spelling of Afrikaans names, a Departmental Committee for the Spelling of Geographical Proper Names (P.O. Box 134, Pretoria) was appointed by the Minister of the Interior in 1937, with clear but narrow terms of reference which were slightly expanded during the first year's work. Ministerial instructions limited the work to the consideration of the names appearing in the Post Office Guide, the Railway Time Tables, and the Road Motor Services Time Tables. A provisional list of about 9000 names has been issued (Union of South Africa, *Government Gazette Extraordinary* (vol. cxiii), No. 2559, 24 August 1938) on which public comment was invited within three months of the date of publication. Dr. H. G. Fourcade responded with vigorous criticism in the *Eastern Province Herald*, and his letters were reprinted in an article on "Geographical names" in the *South African Survey Journal* (vol. 5, pt. 4, January 1939, pp. 164–9). He drew attention to the constitution of the Committee, on which the Survey Board is not represented.

The Committee is at present concerned mainly with the correct orthography of names in modern Afrikaans, which is justified by the stability the language has now attained. The following extracts from a provisional glossary of words of common occurrence in South African geographical names will serve to show that the language has developed to a point at which change must be general if made at all.

Dutch	*Cape Dutch*	*Afrikaans*	*English*
achter		agter	behind, farther
biesjes	biessies	biesies	rushes
blaauw		blou	blue
boschjesman	bosjesman	bosman	Bushman
boven		bo	above, beyond, upper
breed—breede		bree—breë	broad
cijfer	cyfer	syfer	mark
	commando	kommando	armed band
compagnie		kompanjie	company
dauw	douw	dou	dew
de—het		die	the
doorn		doring	thorn
drift		drif	ford
droog—drooge		droog—droë	dry
gelegen		geleë	situated

Dutch	*Cape Dutch*	*Afrikaans*	*English*
gezicht		gesig	view
haver		hawer	oats
haven		hawe	harbour
ijzer	yzer	yster	iron
jacht		jag	hunting, shooting
jakhals	jakhal	jakkal	jackal
	karree	karee	a native drink
	karroo	karoo	parched lowlands
kopje		koppie	*dim.* of kop (head)
olijven	olyven	oliewen	olives
oost		oos	east
regen		reën	rain
rhinoceros	rhenoster	renoster	rhinoceros
rust		rus	settlement
schaap		skaap	sheep
schoon		skoon	beautiful
struys(-vogel)	vogelstruys	volstruis	ostrich
tijger	tyger	tier	leopard
toren		toring	tower
vallei	vley	vlei	a depression containing water
wagen		wa	waggon
wijn		wyn	wine
	wildebeest	wildebees	gnu
woest		woes	waste, desert
zoet		soet	sweet, fresh
zout		sout	salt
zuid		suid	south
zwaar		swaar	heavy
zwart		swart	black

Many familiar terms, such as berg, boom, bron, dal, dorp, draai, hoek, hof, klip, kloof, kolk, kop, kuil, laagte, pad, poort, put, rug, spruit, tuin, vlakte, weg, are unaffected, at least in the singular.

From an examination of names in the provisional list taken from the Road Motor Services Time Tables it is apparent that numbers of modern Afrikaans forms are already in popular use, and the Committee recommends many of them for official use. Purely orthographical change, such as that of names in *blaauw* to *blou*, has been recommended almost systematically, but great caution has been shown with respect to marked philological change, such as that of names in *doorn* to *doring*, *hoorn* to *horing*, etc. The retention of many Dutch forms, such as De Aar, Paarl, Stellenbosch, is recommended, though not consistently, Muysenberg, for instance, being proposed for Muizenberg.

The Committee has endeavoured to regulate the linking and separation of the parts of compound names according to the following principles which are implicit in its recommendations:

(*a*) In names in the definite form the article is to stand apart: De Poort (for Depoort).

(*b*) The parts of names consisting only of personal names to be separated: Carl Meyer (for Carlmeyer), Du Toit, Jan de Boers, Tom Burke, Van Aardt.

(*c*) Afrikaans topographical terms preceding proper names to stand apart: Kaap St. Francis (Cape St. Francis).

(*d*) Proper names and following Afrikaans topographical terms (common nouns) to be written as single words: Algoa*baai* (Algoa Bay), Dutoits*pad*, Pietermaritz*burg*, Vandermerwes*rus*.

(*e*) Afrikaans names consisting of topographical terms (common nouns) associated with qualifying words to be written as single words: *Drieanker*baai (Three Anchor Bay), *Eerste*rivier, *Groot*pan, *Klein*poort, *Laer*fontein, *Oos*eind (East End), *Rode*bank, *Swart*laagte, *Veertien*strome (Fourteen Streams), *Vis*rivier (Fish River).

(*f*) Afrikaans and German qualifying terms to be linked to proper names by hyphen: Agter-Sneeuberg, Aliwal-Noord (Aliwal North), Bo-Voëlfontein, Graaff-Reinet, Groot-Rietpan, Gross-Otavi, Klein-Brak, Noord-Rand (North Rand), Oor-Hex, Oos-Londen (East London), Onder-Blinkwater (Lower Blinkwater), Witte-Elsbos.

(*g*) Afrikaans names consisting of expressions to be hyphenated: Op-de-Tradou, Rus-ter-Winter, Wag-'n-bietjie.

(*h*) Repetitive aboriginal names to be hyphenated: Nkwe-Nkwe (for Nkwenkwe).

(*i*) The possessive form to be rejected from Afrikaans common nouns (Voëlvlei for Vogelsvlei), but retained, though without the apostrophe, with English and Afrikaans proper nouns (Camps Bay—Kampsbaai).

The Committee seems to have striven for rules which would cover all South African names. Its recommendations affecting Afrikaans names accord remarkably well with the principles stated above, though exceptions are to be noticed. For instance, we find conflict between rules (*b*) and (*d*) in such recommendations as Jan de Langesfontein, Willem Burgersrivier (*cf.* Paulpietersburg, Pietermaritzburg); exception to rule (*f*) in Grootbuitfontein (which is Groot-buit fontein, not Groot buit-fontein); to rule (*g*) in Draaivanvisrivier and Op't Hof. The attempt to regulate English compound names in the same manner has been much more conservative; the Committee would nevertheless contract *Saint* to *St.*, but would write *Fort* and *Mount* in full.

Perhaps the most sweeping of all the principles implied in the recommendations is that designed to eliminate alternative spellings, both in English and Afrikaans, whether of the names of different places with the same names or of different forms of the name of the same place. It should not be forgotten however that a name is primarily a sound or sound-sequence of which the main duty is to be distinctive and if possible unique, but that sounds change with time. The written record of the name, on the other hand, becomes a fixed visual symbol which in some instances expresses useful distinctions not conveyed by the sound. This fundamental conflict between phonetics and orthography has to be met by compromise and is best not settled by rule. A lively regularity in the writing of geographical names is better than a stiff uniformity. An examination of the English names in *glen* in the provisional list shows how unsatisfactory they would be if written according to a system. Basseterre and Basse-Terre, Georgetown and George Town, St. Johns and St. John's are the names of different places, and the most we should demand is that the name of a particular place be written only in one way in a given language. Weltevrede (South Africa) is a useful

distinction from Weltevreden (Batavia), and there is room for such differences as Bethanie (Transvaal) and Bethany (Orange Free State).

Afrikaans translations of English names have been suggested where necessary, and with admirable restraint. Some attractive pairs are already in existence, such as Pine Lane—Dennelaan, and those proposed are good, except for Newera, which is bad if meant to be Afrikaans and worse if intended to replace New Era. The question of different places with the same name, such as Swartlaagte (Orange Free State) and Swartlaagte (Transvaal), and of different names with the same meaning, such as Hope Town (Cape Province) and Hoopstad (Orange Free State), or Lions River (Natal) and Leeustrom (Orange Free State), have not been examined. Consideration of aboriginal names is confined to a few recommendations of Afrikaans in preference to English orthography (*Kwagga*water for *Quagga*water), and to a few slight changes, as of Homteni to Umtini.

The work of the Committee is extremely delicate on account of the complex linguistic record and relationships involved. South Africa presents a succession of aboriginal, Portuguese, Dutch, French, English, German, and Afrikaans names, and the aboriginal names have been recorded with international variety. Now that a committee exists however the country has an opportunity of reducing its unwieldy nomenclature to order. In most modern States the best authority on geographical names is that for topographical survey, because it collects the names and records their history, and the South African Committee, without the active assistance of the Survey Board, will be deprived of most useful means, if not of actual authority.

English names in South Africa need the same consideration as that given to Afrikaans names. The P.C.G.N. has ascertained through official channels that Cape Town, Hope Town, King William's Town, Simon's Town, Grahamstown, Cape Recife are the forms of those particular names with the best titles for use, but they do not necessarily appear so in South African official publications and, with the exception of Grahamstown, do not appear so in the Committee's provisional list. Dr. Fourcade has illustrated the nature of a proper title by giving that of the name Zitzikamma. Another important consideration is the confusion in nomenclature that arose when the British occupied the country. Good English equivalents were coined for many Dutch names of which the meanings were obvious, like Table Mountain for Tafelberg, Orange River for Oranje Rivier, Fish River for Visch Rivier; but others, nearly as obvious in meaning, such as Olifants River for Olifants Rivier, Breede River for Breede Rivier, Klein Fish River for Klein Visch Rivier, were bilingual barbarisms; and others again, like Zuurberg Mountains for Zuurbergen, were redundant as well. Now is the time for South Africans to insist, if they so desire, that a place or feature may have a name in one language or another, or names in both, but not a name which is a mixture of both. It may be too late to correct barbarisms like Transvaal, but not those like Modder River. The Committee has, in fact, suggested a few such corrections (Moerasvlei for Morassvlei), but names on maps are at present beyond its scope.

Dr. Fourcade's objection to the modernization of such names as Stellenbosch, notwithstanding his satisfaction on hearing that the Committee does

not propose to alter established Dutch names, indicates that there will be public resistance to the change of any established name. Presumably there will also be partisans of Afrikaans who will want everything changed. The situation seems to call for a grading of names on historical grounds, but, with the examples of recent sweeping reforms of spelling in Belgium, Brazil, Norway, Portugal, and Sweden, there can be no valid objection to the modernization of all South African names which can reasonably be classed as Afrikaans. An inspection of names in *De* in the provisional list shows that names to be classed as Dutch are, as might have been expected, most numerous in the Cape Province. This part of the work has therefore a regional aspect, perhaps even with regard to Afrikaans, for the *bosman* of standard Afrikaans appears to be represented by *boesman* in the Transvaal. The example of Belgium ("Flemish names in Belgium," *Geogr. J.* 92 (1938) 539–40), where the bilingual problem, the questions of dual names, of the precedence of names, and of the reform of Flemish spelling have all been admirably settled, is closely relevant to the work of the Committee.

The names of so many native things in South Africa have both English and Afrikaans forms (assegai—assegaai, kudu—koedoe) that two systems of orthography must inevitably apply to the aboriginal elements in geographical names. Unfortunately the British accepted the Dutch spelling of certain aboriginal words, with the result that most English-speaking people outside South Africa now make *karoo* rhyme with *too* instead of with *go*. But here again the existence of the Committee provides the opportunity for correcting the English and Afrikaans orthography of all such aboriginal names as are still in native use, taking full advantage of such aids as D. M. Beach's 'The phonetics of the Hottentot language' (Cambridge, 1938).

The R.G.S.II system is now well established in British colonies and mandated territories, and its adoption throughout British Africa would produce a desirable regularity in the English orthography of aboriginal names. Flemish influence has resulted in the application of excellent rules in the Belgian Congo (see *Geogr. J.* 12 (1898) 85), which, if adapted to Afrikaans, might well bring about an accord similar to that possible in R.G.S.II orthography. The South African problem of dealing with aboriginal names, though difficult, is not unique; the Geographic Board of Canada has had to deal with a variety of Indian and Eskimo names in both English and French form, and has reduced its procedure to a very simple set of rules (*18th Rept. Geogr. Board of Canada*, Ottawa, 1924, pp. 8–10).

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THE GEOLOGY OF ITALIAN NORTH AFRICA

MISSIONE SCIENTIFICA DELLA REALE ACCADEMIA D'ITALIA a Cufra (1931–IX) [under the leadership of ARDITO DESIO]. (R. Acc. d'Italia. Viaggi di studio ed esplorazioni. 3.) *Roma*, 1934–39. 10×7 *inches*. Vol. I (1935), Studi geologici . . . By A. DESIO. viii+464+VI *pages*. Vol. II (1939), Studi morfologici sulla Libia Orientale. By A. DESIO. 216+X *pages*. Vol. III (1934), Studi palaeontologici e litologici . . . 492+XXXI *pages*. *Illustrations and maps*. *L.*100 (*vols. I and III*); *L.*50 (*vol. II*)

THE fall of Kufara (Cufra) and occupation of the vast area that it had so long dominated have been followed by scientific investigation. The Italians have carried out important topographical and other surveys, and it was natural that a geological reconnaissance should be completed as soon as possible: a Mission was organized by the Royal Academy of Italy in 1931 under the leadership of Professor Ardito Desio, who already had to his credit journeys in Cyrenaica. It will be remembered also that he was a member of the Duke of Spoleto's expedition to the Karakoram (1929). The Missione scientifica della Reale Accademia d'Italia a Cufra ranks with the Mission au Tibesti of the Académie des Sciences de l'Institut de France as an outstanding event in the geological exploration of northern Africa.

The reports of Desio's journeys have now been completed in three volumes. The broad outline of their plan is as follows: Volume I, part i, Geology—Cyrenaica, Libyan desert, Tripoli, and eastern Fezzán (itinerary); part ii, Stratigraphy, including comparisons throughout with coeval deposits in adjacent territories; part iii, Tectonics; and also general summary and comprehensive bibliography and separate indexes of authors, localities, fossils, and contents; there are abundant faunal lists and measured sections. Volume II deals with the morphology of the same general regions as in volume I (thus making the two volumes admirably interdependent), with a general review of the morphological evolution of the country; bibliography and indexes are as in volume I, including also a list of terms. Volume III is devoted to palaeontology and petrology, specialists' reports on the material collected by the Mission, with bibliographies and general (coordinated) indexes as above. This volume can therefore be used in intimate association with volume I, part ii. The whole is a model of common-sense handling of the complex results of a long expedition.

The main journey from the Mediterranean to the far south occupied several months, and camels were used for the major part of the distance. The route lay from Gialo *via* Wadi Zighen southwards, offsets to 'Uweinat and Rebiana, and a long journey *via* Tazerbo, Uau en-Namus, and Uau el-Chebir to el-Fogáha and Marada. Detailed information derived from the reconnaissance to Giarabúb (Jaghbub) and travels in Tripoli and Cyrenaica between 1926 and 1932, which have been the subjects of other publications by Desio, is also made available.

The following is a general account derived from the three volumes, with some other observations:

Geology.—The oldest rocks are schists and gneisses, probably Archaean, invaded by more or less unaltered intrusions including some of Palaeozoic age; they outcrop in the remote south, as in the now much-visited region of 'Uweinat, Archenu, and farther west in Gebel Neghei. The complexes are associated with those of Tibesti and Ahaggar. It may be noted that at times the high ground formed by the plutonic rocks receives heavy showers which supply a few springs, but the run-off water reaches the surrounding plains, where it is evaporated or

absorbed. The down-rushes of water afford examples of the processes which may have carried rock debris out into the plains to provide an alluvial carpet now being denuded: the absorbed water no doubt takes part in the underground supply of the sandstone areas farther north.

Overlying the metamorphic complex in southern Libya are sandstones from which Desio reports the discovery of Upper Palaeozoic plants. They recall and considerably amplify the fragments found some years ago in probably similar sandstones in the eastern part of 'Uweinat. Two problems therefore present themselves. First, where are the massive sandstones and other rocks of Lower Palaeozoic age that outcrop from beneath the Upper Palaeozoic sandstones in Ennedi, Erdi, Tibesti, in the region north of the Ahaggar, and in the Fezzán? Secondly, to what extent are the widespread sandstones of the southern part of Libya to be included in the Upper Palaeozoic or in the Mesozoic? Perhaps the answer to the first question cannot be found in southern and central Libya, since the older group of sandstones, if ever deposited there, have probably been removed or concealed; the unconformity between the younger sandstones and the crystalline rocks is correspondingly greater, but no more apparent in the field. On the other hand the Fezzán has provided fossiliferous marine Devonian strata which overlie a notable Lower Palaeozoic marine series passing westward into French territory, and both groups of sandstones are probably present in south-west Egypt.

The second question is open to debate. Desio evidently regards much of the "Nubian Sandstone" (and quartz pebble beds) as potentially Palaeozoic, but he correctly points out that such rocks constitute a facies rather than a stratigraphical unit. Elsewhere the "Nubian Sandstone" or its equivalent is regarded as a Mesozoic formation, locally unconformable on the Upper Palaeozoic sandstones. Herein lies one of the interesting problems of north African geology. The water-bearing powers of these debatable sandstones are now famous, and since they dip northward beneath younger sediments they constitute that hidden reservoir of water which maintains some of the oases, and they hold out prospects of valuable supplies elsewhere.

The next group of beds in the succession are unquestionably marine, the products of the transgressive Upper Cretaceous Tethys. They have been mapped along the western frontier zone of Tripoli, but do not seem to outcrop across the greater part of Libya; they are prominent again within the latitudes of the oases of the western desert of Egypt, Dakhla, and Khârga, where they lie at the foot of the Lower Eocene scarp. Marine Cretaceous beds are in fact widely overlapped by Lower Eocene, and transgression carried the shores of the Tethys to the northern flanks of Tibesti, whence the Palaeogene succession can be traced northward in detail, often in highly fossiliferous beds. The suggestion may be hazarded that southern and central Libya stood relatively high in Cretaceous times, allowing continental deposits of the "Nubian Sandstone" type to accumulate while the Tethys encroached upon the old (Palaeozoic) basin of Algeria and transgressed into the continental basin of the northern Nilotic province. A comprehensive succession of marine Cretaceous beds occurs in inliers in Tertiary deposits between Bengasi and Salûm (Es Sollum), Cenomanian to Danian strata being recognized.

The history of Libya after the Lower Eocene transgression is analogous to that of Egypt—recession through Palaeogene and Neogene stages so that the Pliocene shore is within certain limits that of the present day. Desio's work shows however that considerable oscillations of shore-line took place, and he has mapped and subdivided the often richly fossiliferous beds in much detail. The palaeontological and stratigraphical data especially of the Miocene beds in

Cyrenaica and Tripoli will be of interest to all geologists concerned with the palaeogeography and faunas of the Tethys in their broadest applications.

As in Egypt, the retreating Tertiary shore-lines were followed by continental accumulations, pebble beds, sands, clays, especially of Oligocene age, often masking subjacent marine beds. It emerges therefore that such deposits may be found from south to north almost throughout the length of Libya, lithologically similar and monotonous, and their ages may range from Palaeozoic to late Tertiary. Over the whole has been drawn the veil of the alluvial accumulations and sand-dunes, derived from those self-same sources. Of this formidable array of continental deposition and erosion Desio has kept an objective view and he adds an interesting review of Tertiary palaeogeography and of the distribution of certain types of silicified woods.

Tertiary and later volcanic rocks dominate the Fezzán, great sheets of lava being mingled with volcanoes, necks, and craters; elsewhere, especially in the south, smaller volcanic fields and isolated necks and craters have been mapped. The greater part of Libya seems to have been relatively stable throughout its geological history, but Cyrenaica has been severely disturbed and fractured probably in pre-Upper Miocene times; sub-recent movements have led to submergence of much of the coast and the creation of numerous flooded inlets and anchorages.

Morphology.—In reading the contents of volume II one's mind naturally turns to the well-known studies of nineteenth and early twentieth-century travellers in the North African deserts, and it is pleasing to find their names and observations abundantly quoted. Desio has done a special service in blending the past with an account of what he himself saw in the arid parts of the new Italian territories, combining such observations with plates, sketches, and maps. He prefaces his remarks by a summary of general relief and climate; the volume is a model of good planning and marshalling of observations on widely scattered and varied regions. His conclusions reflect on those held in French territory and in Egypt: thus evidently he regards the *serir* as very ancient alluvial spreads, probably swept from the south (the view held in French territory), more or less reconstructed by wind action (the opinion generally held in Egypt). The enclosed basins of the north are as perplexing as in adjoining regions; in some tectonic processes seem to have played a part (as in Algeria), in others differential erosion of interbedded hard and soft horizontal or gently dipping strata (as in Egypt). To these Desio adds his own impressions of the traces of ancient drainage lines and of unequally denuded sand, pebble beds, and clays; these views command attention since in Egypt, nearby, they are hard to accept, whereas in Algeria on the other hand they are convincing. So, in regarding the history of the desert area, Desio envisages widespread alluvial coverings variously modified by later run-off, deflation, redeposition, and wind action, the skeleton of the underlying rocks thereby being revealed and likewise modified; land movement and changes of Pleistocene climate, increased and decreasing rainfall, have probably played a final part in these processes.

The materials of the great Ergs (sand-dune areas) may have been derived from the alluvial deposits, from the underlying rocks, and even in certain areas from late or post-Tertiary unconsolidated marine beds. It will be realized that, on the whole, there is much in common between the conclusions of Desio in Libya and of Gautier in Algeria.

The rocky border lands of the Fezzán are described in some detail, but do not call for special comment here. In the highlands of Cyrenaica, still comparatively well watered, there is a notable drainage system and locally karst topography with dolines.

Palaeontology and petrology.—Systematic studies of the material collected by the Mission are placed together in a single volume. Desio himself provides an account of the Palaeogene lamellibranchs and a general review of the Neogene marine mollusca; there are a dozen reports by specialists, many of whom are well known in this country. The contributions to Palaeogene and Neogene faunas as a whole have a special bearing on Egyptian stratigraphy, and as might be supposed there is a close correspondence between the assemblages of the marine Tertiary beds in the two regions. This systematic material however will be of as much value outside North Africa as within it (*e.g.* reports on the Tertiary foraminifera, corals, echinoids, and various groups of the mollusca). Some Tertiary vertebrate remains (from various horizons probably Middle Eocene to Miocene) and sub-fossil land mollusca are also described and, with the above, will be noted specially by those concerned with the continental faunas of adjoining territories. Interest attaches also to the occurrence on the surface over a wide area from 'Uweinat almost to the coast of fragments of ostrich eggs (as in Egypt and the Sudan), with a few examples also (in the north) of another shell of peculiar type which is referred to a new species, *Psammornis libycus*. Molt.[1]

Palaeobotany is well served not only by a general account of the plant impressions and fragments but by a long description of a new species, *Nematophyton saharicum*. A. Chiarugi, accompanied by an exhaustive review of a dozen other species of the same genus known from various parts of the world.

A hundred pages are devoted by P. Gallitelli to the petrology of the ancient metamorphic intrusive rocks and the more recent trachy-phonolites, basalts, and allied rocks (Tertiary to recent). These are very welcome contributions to African petrology; the nepheline-rich Libyan rocks are associated with Lacroix's "petrographic province" of Chad and are referred also to Artini's Tripolitanian types. The petrographical descriptions are supported by a number of chemical analyses. Finally a general description and mineral analyses of sand samples form the subject of a separate report; their polygenetic origin is evident, and the source rocks include igneous and metamorphic types. The material available for study was limited, but these results certainly reflect interesting light on Desio's general thesis of the southerly origin of the *serir* and of the Tertiary and later superficial accumulations.

Most of the above reports are illustrated by beautifully produced plates and are mines of information. It is greatly to be hoped that the general application and value of the material will be known, since there is always the danger that information of this sort will fail to reach the libraries and laboratories where it would be of the greatest service. The publication of this note on the work of the Mission and of its collaborators may also assist in bringing these unquestionably important studies to the notice of those who may not be interested in African geology for its own sake.

K. S. SANDFORD

[1] Described in vol. I, p. 383.

DRAKE'S PLATE OF BRASS ANALYSED

DRAKE'S PLATE OF BRASS AUTHENTICATED: the report on the plate of brass. By COLIN G. FINK and E. P. POLUSHKIN. *San Francisco: California Historical Society* (*Special publication No.* 14), 1938. 10½×7 *inches;* 28+26 (*plates*) *pages; illustrations.* $2.75 (*in paper wrappers* $2.00)

IN 1579 Sir Francis Drake landed in California to recondition his ship, and, according to 'The world encompassed by Sir Francis Drake,' he set up a post on which was nailed a brass plate, bearing an inscription, and containing a hole in which was inserted a sixpence of current English money. What is supposed to be this brass plate was acquired by the University of California in 1937, the plate having been picked up in the previous year on a ridge at the head of St. Quentin Bay, an arm of St. Francisco Bay. After the announcement of the discovery, further information was received that the same plate had been picked up three years before on the Laguna Ranch, which borders on Drake's Bay, and had been thrown away near to, but not exactly at, the place where it was found in 1936. Since doubts were expressed as to the authenticity of the plate, the latter was submitted to certain scientific tests which are described in the present book. In view of the limitations of the scientific methods used, the book was submitted to the Keeper of Western Manuscripts, Bodleian Library, Oxford, who points out that, owing to the circumstances in which the plate was engraved, it is impossible to authenticate it by comparison with contemporary lettering. The engravers of the plate were apparently content to make a succession of cuts without attempting to copy current form, for which the sixpence would at least have provided a model. The forms of *B*, *N*, and *M* cannot be paralleled from other sixteenth-century inscriptions, and the numerals, particularly the 5, are also suspect. The usual sixteenth-century lettering would have been no more difficult to cut.

The authors have examined the general condition of the plate, and have made spectrographic analyses of two very small portions of the patina, and of two small portions of the metal. They have also made a microscopic examination of a small piece of the metal cut off from the edge of the hole. The choice of this position is open to criticism, since intense local distortion may have been produced during the cutting of the hole, and this may affect the distribution of inclusions, this distribution being one of the points to which the authors attach great importance. The evidence favours the view that the metal is an old brass with an old and naturally formed patina, as distinct from a patina produced by artificial chemical methods. In so far as scientific methods can confirm the authenticity of the plate, the critical point is clearly whether the lettering is also old, and here the position is made difficult by the fact that the plate had been scrubbed and partly cleaned before the present examination. In favour of the antiquity of the plate is the fact that the letters were filled with black material similar to that found on the back, but against this must be set the fact that "some of the grooves still had sharp, well-preserved edges." The chemical analyses, as the authors admit, are inconclusive.

In considering the value of the authors' tests, the limitations of their methods must be emphasized. In the case of an oil painting, physical and chemical tests may indicate the age of the painting, and the expert may then identify the individual artist by his characteristic technique. In the present case no such personal characteristics exist and, at the best, the methods used can only show the plate to be an old brass with equally old lettering. We do not therefore consider that the tests described justify the title of the book, but would say

rather that they show clearly that the brass is not obviously modern. We are surprised that the authors have not discussed in greater detail the possibility of letters having been made at a later date upon an old brass. More decisive information might be obtained if the owners were willing to sacrifice the back of the plate, and to have a few of the letters very slightly enlarged. The authors lay great stress on the presence of small quantities of magnesium in the brass, since this element is not a constituent of modern brass. They also find magnesium in the patina, in one case as a major constituent, although according to their Table II magnesium is not a constituent of the soils of the district in which the plate was found. The meaning of this table is however not clear, since although it is described as giving the results of the analyses of the soils, no mention is made of aluminium or silicon, which would be expected in almost any soil, and which are detected in both the brass and the patina. Systematic analyses of the patina and underlying metal from places on the back of the plate would clearly be of great interest, since if the patina contained more magnesium than the metal, it would suggest that the patina had been formed in contact with a soil containing appreciable quantities of magnesium. Comparison of the magnesium content of the patina at different places with that of the underlying metal, in conjunction with microscopic work, might also distinguish between magnesium as a genuine constituent of the brass and as a foreign substance which had entered into fine cracks. The authors emphasize the presence of surface cracks and defects, but do not discuss the possibility that these may introduce foreign matter into the small specimens used for spectroscopic analysis. After removing the patina, a microscopic examination of a relatively large area at the back of the plate would also give conclusive evidence whether the brass had been prepared by hammering as in old metal, or by rolling as in modern brass. A more detailed examination of the letters, involving the removal of a small quantity of metal, might indicate whether the letters had been made at a later date upon an old brass. We hope therefore that the authors will continue their experiments on this most interesting problem.

W. HUME-ROTHERY

REVIEWS

EUROPE

TWENTY CENTURIES OF ENGLAND: being the annals of Bishop's Stortford. By W. Basil Worsfold. *London and Cheltenham: Ed. J. Burrow and Co.*, [1939]. $11\frac{1}{2} \times 9$ *inches; 162 pages; illustrations, map, and plan.* £3 3*s*

The avowed object of this work is "to awake a more lively interest in Bishop's Stortford and its countryside," but since the history of an episcopal manor is apt to be a dull affair except to the student of local administration and economics, it is not surprising that much of the book is taken up with personalities, such as Arthur Lord Capel, the Houblons, and Cecil Rhodes, who have other claims to fame than their connection, however real, with the town.

Quite the best feature of the book is its illustrations, of which there are some eighty in all, many of them from the author's own sketches and photographs. It seems fair to assume that there is no considerable monument or piece of architecture in the neighbourhood that has escaped notice or illustration here, and there are also two excellent maps. The text, apart from one or two lapses into an embarrassingly arch historic present, reads fluently and directly, and quite apart from its competence gives the impression that the author enjoyed writing it. The reader might justifiably have been spared the conjectural account of Stortford in that prehistoric period during which all we know of a very large number of places suggests that they were depressingly alike. The attempt to win the approval of the general reader by clearing the text of footnotes is occasionally defeated by the appearance of unnecessary parenthetical dates. The author also shows a certain independence of established authority in his interpretations of place-names, though it is just to add that he never makes those interpretations the basis of an otherwise untenable theory.

L. C. H.

MAP OF BRITAIN IN THE DARK AGES. North sheet, with pp. 43 [discussion, supplementary maps, and index]. Scale 1 : 1,000,000. *Southampton: Ordnance Survey*, 1938. *Size of map* $33\frac{1}{2} \times 25$ *inches* (*folded to* $8\frac{1}{2} \times 5\frac{1}{2}$ *inches*). 5*s*

This is the welcome counterpart to the southern sheet published in 1935, with which it has a substantial overlap. The basis is the same 1/M map, in colour, and the same conventional signs are used. Brochs and earth houses are reserved for a special map, because some of them belong to the Roman Britain distribution. Portable objects with engraved symbols are also omitted. The five diagrams show principal routes, tribal areas, and places mentioned in the Introduction; symbol-stones; cross-slabs with and without Pictish symbols; and the "vine-scroll" and designs derived from it, as indication of the northward spread of Anglian influences. The execution of this map is worthy of the Ordnance Survey. Symbols and letterpress are conspicuous but not over-emphasized, and the border and cover-design, incorporating ornamental work of the period, are pleasant and appropriate.

The period covered by these distributions is roughly A.D. 450–850. Exact dates cannot be given, as was possible in the southern sheet, for historical reasons; and the sources of place-names are less adequate; older forms, when they can be restored with certainty, are given with an asterisk. The area needs a word of commendation, for it includes both Northern Ireland and the Orkneys

and Shetlands, and consequently also the far-away cashel on North Rona. Such a map will have attractions for others besides archaeologists.

The monuments are unusually restricted in kind. There are no roads, no linear earthworks, no distinctive pottery, and coins only from Saxon England and from Baghdad. The memorial-stones were personal monuments, and probably carry with them many stone-lined graves of unnamed persons. Of the crosses, only those of Anglian (Northumbrian) type are marked, because other crosses and cross slabs seem to be of later date. The hill forts give some clue to tribal headquarters; the cashels, as in North Ireland, to Christian communities. Crannogs are ill-dated (though some are marked here), and other sites are almost unrecognizable without spade-work. It has not seemed safe to plot more than the Menteith marshland; and forests have not been indicated, even on the parts which overlap the southern sheet. All this makes for simplicity, and eventual accuracy: it is easier to add one fact than to delete a fancy, and it is a challenge to the contributors to another edition.

Much that eludes the cartographer has been well and concisely set out in the brief Introduction. The Survey has been well served by historians and archaeologists. The five "cultural regions" between which Scotland was divided at the end of the Dark Ages are treated separately, and characterized in their historical perspective—British, Anglian, Scottish, Pictish, and what is aptly described as the "Prehistoric Hinterland" where "archaeology and philology can as yet do little to supplement these bare facts of history," so that " the very emptiness of our map has a certain significance." The same moral may be applied to the whole of this admirable compilation: it is indeed rightly "a key to the state of knowledge at the time of its compilation " (p. 6). It is also an indispensable instrument of research. J. L. M.

THE ROMAN ROADS OF WALES: an historical survey. By S. O'DWYER. *Newtown, Mont.: The Welsh Outlook Press*, 1934–38. $9\frac{1}{2}\times6$ *inches; in six parts, about* 20 *pages each; maps.* I–III, 1*s* 6*d each;* IV–VI, 2*s each*

THE ROMAN ROADS OF CHESHIRE: an historical survey. By S. O'DWYER. *Newtown, Mont.: The Welsh Outlook Press*, 1935. $9\frac{1}{2}\times6$ *inches;* 22 *pages; map.* 2*s*

This stimulating series of pamphlets, giving an account of the Roman roads and tracks of Wales and Cheshire, has appeared at intervals since 1934. The booklets are attractively printed and are handy for the pocket; each is provided with a folding map, drawn by the author himself, and some with more than one.

One cannot but admire the industry of the author, for it is evident that he knows the countryside and has recorded his own observations in the field, as well as those derived from the study of maps. He shows acquaintance with the works of earlier writers and with archaeological publications, and each pamphlet has a section dealing with place-names. Contemptuous references are frequently made to the Ordnance Survey map of Roman Britain, and to the published Inventories of the Royal Commission on Historical Monuments, whose conservatism is not to his taste. He himself however shows no critical faculty in sifting evidence, for his determination to fill his maps with Roman roads has led him to use all manner of facts and fancies without discrimination. Any roadway older than the time of John Metcalfe, who started road-making about 1765, is treated as necessarily Roman, for the writer's avowed aim is to "clear the ground in such a manner as to leave it to others to disprove the Roman origin of the roads which are described as such." Hill-top forts, like Eddisbury, or promontory forts, like those in Gower, casual finds of Roman pottery and coins, and even pack-horse bridges, are therefore accepted as good evidence for the lines

of Roman roads. English and Scandinavian place-names are pressed into service in the same manner.

It is perhaps unfair to apply too strict a scientific test to work that aims at a popular appeal, though a high standard of accuracy need not be inconsistent with such an aim. The tracing of ancient roads is a fascinating hobby, and it is to be hoped that this series, in spite of its obvious shortcomings, will stimulate others to explore the glorious country with which it deals: discoveries of archaeological value are often made by the observant amateur, for the field is a large one. The maps however will be found to be inadequate for the field-worker. They are indifferently drawn and seriously overcrowded with names. Moreover certain Roman sites and proved Roman roads are not distinguished with clearness from the host of others classed as Roman, often on too slender evidence or no evidence at all. Nowhere is the commonly accepted distinction between legionary fortress, permanent fort, temporary camp, villa, and inhabited site made clear. The field-worker who takes Mr. O'Dwyer as his guide would be well advised to supplement his equipment with a set of one-inch maps, and to consult for himself all the references that are so conveniently collected in small compass in these pamphlets. P. C.

INDUSTRIAL BRITAIN: a survey. By ALBERT WILMORE. New edition, revised by L. R. LATHAM. (Harrap's New Geographical Series. General editor: R. N. RUDMOSE BROWN.) *London: George G. Harrap and Co.*, 1939 (*first published* 1930). 8×5 *inches;* 368 *pages; illustrations and sketch-maps.* 6*s*

This book was first published in 1930 and reviewed in the *Journal* for June 1931. In this second edition the main characteristics of the first edition have been retained, but the statistics have everywhere been brought up to date. The treatment remains elementary, but the book gives a clear account of the major British industries, with due emphasis on localization and interdependence. One or two points might be dealt with in any subsequent revision. The names of the companies, for example, on p. 86 might be given; the two tables on p. 90 do not seem to be strictly comparable unless the figure of 90 cwt. in the second table is an error; the word "clothier" in the seventeenth century did not mean, as is implied on p. 302, one who made clothes, but one who was engaged in the manufacture of cloth. These are very small points in what is a useful and readable text-book. T. S. W.

DEWPONDS IN FABLE AND FACT. By ALFRED J. PUGSLEY. *London: Country Life*, 1939. 7×4½ *inches;* x+62 *pages; illustrations.* 3*s* 6*d*

This book is to be welcomed, for after a most careful review of all the circumstances connected with the so-called dewponds of the chalk downs and other uplands of England the author dismisses "the 'dew' pond idea" as a "pseudo-scientific swindle." Apart from the complete inadequacy of actual dew as a factor in the upkeep of the ponds, it is shown that Martin's theory of maintenance by hill-mist, proposed for the Sussex downs, will not account for the facts that the ponds are numerous on the Berkshire and Wiltshire downs, where mist is much less frequent than on the South Downs, and that they usually have no surrounding bushes or trees to collect water from the driving mist. Although there are minor problems still to be solved, it is made quite clear that the essential factor is rainfall. The ponds are so designed as to make the most of all the rain which falls, and the ratio of the area of the collecting margins to the evaporating surface together with the fact that the annual rainfall is roughly double the evaporation provides the clue to the problem. Mr. Pugsley's conclusions agree with those of Mr. E. G. Bilham, who in his recent book on the climate of the British Isles effectively disposed of the dewpond myth. L. C. W. B.

MONUMENTAL ART OF NORTHERN EUROPE FROM THE STONE Age. By GUSTAF HALLSTRÖM. I. The Norwegian localities. *Stockholm: Bokförlags Aktiebolaget Thule*, 1938. 10½×7½ *inches;* 544+[64] *(plates) pages; illustrations, plans, and location-map. Also separate atlas of* 48 *plates* (15½×11 *inches*). £3

This is the first of two volumes designed to make available in English the important series of rock-engravings and paintings often referred to as the "Arctic Art Group," though embracing several distinct styles. The fascination of the engravings lies partly in their content, reflecting the outlook of food-gathering communities of the Stone Age, and partly in their situation among some of the wildest scenery in Scandinavia. It is perhaps in their "open-air" character that there lies the secret of their appeal to English people. There is nothing more fascinating than exploring sites of this kind, and the only way to enter into the spirit of the art is to see it in its natural setting. Moreover, if some of the more remote localities are visited, there is always a chance of new discoveries. The rapidity with which these have been made during recent years has indeed proved a serious embarrassment to Dr. Hallström in the long-planned preparation of his book. When he began his field-work in Norway in 1907 only 8 localities were known; during his last visit in 1917 there were already 22; when his manuscript was complete there were 38, and, while the book was in press, this number has been again increased.

The present volume embodies the results of the author's field-work, supplemented by his critical study of the publications of the last twenty years, including the important monographs of the Norwegian archaeologists Engelstad, Bøe, and Gjessing. The plates in the accompanying portfolio reproduce his own tracings of such engravings and paintings as were known up to 1917. Many of the new discoveries are illustrated by text-figures from published sources. It is to be regretted that the splendid series of photographs by the author, printed at the end of the text, should have been reproduced as photogravure instead of as half-tones: they have lost seriously in definition. The text is far too long. Each site however is allocated a separate chapter and many of the digressions are clearly labelled, so that the book is easier to consult than its bulk suggests. The index, which will doubtless appear at the end of the second volume, will help still further to lighten the task.

As the author's conclusions are reserved for the second volume it only remains to praise the present one as offering the most complete text of a remarkably interesting prehistoric art group which has yet appeared. The volume embodies the results of the pioneer researches of half a life-time and one feels that the author has spared no pains to make it complete. His second volume will be awaited impatiently, and both must surely find a place in all libraries concerned with the history of art or the study of early man. J. G. D. C.

HAPPY COUNTRIES. By V. C. BUCKLEY. *London: Hutchinson and Co.*, 1939. 8½×5½ *inches;* 288 *pages; illustrations and route-map.* 12*s* 6*d*

This record of travel experiences in Denmark, Sweden, Finland, and Norway is the outcome of a 5000-mile motor, air, and rail tour, and it is as colourful and varied in detail as a Swedish *smörgasbord*. Little escaped the eye of the author in Copenhagen, and the charm of the city is suggested by his descriptions of the open flower market, the Langelinie, the silver workrooms of Georg Jensen, and the Grundtvig church in an outlying suburb. The treatment of Sweden is on similar lines, and we are hurried rapidly through the south to Stockholm. Newness is the keynote of Helsinki, the old wooden houses now having mostly disappeared, but the Greek Orthodox Uspenski Cathedral still dominates the

city. The account of rural Finland provides a striking contrast with life in the capital, but a long drive across the Arctic circle brought the author once more into Sweden and eventually to Trondheim, "the focal point of Norway's spiritual and economic life" in the Middle Ages. Its spacious lay-out and Gothic cathedral certainly suggest the prosperity of the past. Bergen, with its Hanseatic houses and the open-air museum of Lillehammer, are set against the Vi kan exhibition held in Oslo in 1938, illustrating the age of "concrete and chromium." The photographs are pleasing and, together with end-page maps showing the route covered, complete a well-balanced survey of northern Europe.

A. F. A. M.

KEEPERS OF THE BALTIC GATES. By JOHN GIBBONS. *London: Robert Hale*, 1939. 9×5½ *inches; 252 pages; illustrations.* 10*s* 6*d*

Although it has all the appearance of being an attractive travel book on the Baltic lands, this book is spoilt by the refusal of the author to probe beneath the surface of much that he saw, and by his failure to substantiate information gathered in the course of his hasty journey through the countries described. Where are the "gravely desolate woodlands" of Skåne (spelt Skane) referred to on p. 27? In any case it is not possible to "run almost for hours" through the one tiny province of Sweden which offers closest analogies to the open pastoral and arable landscapes of adjacent Denmark, with the same windmills and hedge-bound fields. There is a note following the title page to the effect that "various foreign accents have been omitted throughout the book." It is unfortunate that English writers when adopting this slip-shod practice do not realize that the omission is equivalent to a spelling mistake. In this case Lübeck and the Åland islands are two such instances. The illustrations are one of the pleasing features of the book. The views of Helsinki's new buildings and the archipelago site offer interesting comparisons with those of the Polish creation, Gdynia, the barren foreshore with the display of curious fishing nets (p. 240) contrasting with the new port and its modern warehouses. A. F. A. M.

DIE OBERFLÄCHENGESTALTUNG FINNLANDS: eine übersichtliche Darstellung der Morphographie und Morphologie sowie der Morphogenie in chronologischer Beziehung. By V. TANNER. (Bidrag till Kännedom af Finlands Natur och Folk, utgivna af Finska Vetenskaps-Societeten. H.86.) *Helsingfors: (Societas Scientiarum Fennica).* 1938. 9×6 *inches; 762 pages; illustrations and maps.* 240 *mk.*

Professor Tanner has produced a book which gives an admirable summary of of the physiography of his country. He knows it so well that one realizes it is a genuinely first-hand account. Finland is a land of lakes: 61,964 are to be counted on the existing maps, but when the topographical surveys are complete it is estimated that there will be between 80,000 and 90,000 in all. These lakes are however very unequally distributed over the country.

The book is divided into three main parts: a general description of the main features of the country; the morphology; and finally the morphology in its chronological development. In the first part the author is mainly concerned with height relationships and with the major physiographical areas and watersheds. It is perhaps a pity that a large, and possibly coloured, general map was not included in the volume. The maps of the whole country in the text are on too small a scale to make reference satisfactory. In his second part attention is given to the peneplanation of Finland and also to the interactions of the petrographical composition and structural relationships of the underlying rocks (*Felsuntergrundes*) on the surface forms of the peneplain. There follows a

lengthy discussion on the effect of tectonic trends on surface forms. These trends are usually very ancient. Dr. Tanner also points out that the consideration of the influence of fracture-lines (*Spaltentektonik*) on a statistical basis is worthless if large areas are considered, but nevertheless fracture-lines have been a very important factor in the geomorphological development of Finland. Considerable difficulty however faces the investigator because good large-scale maps are lacking for large areas. In the third part a more detailed and geological account is given of the Fenno-Scandian mass. The various orogenic phases are briefly described, as are also the erosion periods.

The geographer will turn with great interest to the second half of the book, where he will find excellent accounts of glacial land forms. Finland was apparently subject to two glaciations, the second being the more extended. The effect of the ice is described in much detail under erosion and accumulation forms. Accounts are given of the formation of the detailed features (*e.g. Rundhöcker*) as well as of valleys, fjords, and lakes, some of which are in erosion hollows. As it is largely a low-lying country some of the more spectacular features of Alpine glaciation are missing, but, on the other hand, accumulation forms are numerous. It would be impossible to outline satisfactorily even the major factors in the production of these land forms, and it must suffice to call attention to the many photographs and large-scale maps illustrating them. A cursory glance at these pictures alone gives a comprehensive notion of morainic and esker topography. Particular attention is given to the Salpausselkå moraines.

Finally attention is given to the effect of melt-waters and also to post-glacial changes. Apart from the numerous existing watercourses there is abundant evidence of past rivers in the form of dry valleys and dead waterfalls. The Baltic is known to be a rising area at the present time, and this matter is discussed at some length and well illustrated by maps and diagrams. Some interesting examples are given of the effect of this upward movement of the earth's crust on the increase of land, and also of the movement of ports towards deeper waters as a result of delta-building.

Few books are so profusely illustrated. There are 442 pictures, maps, and diagrams included. Many of the photographs are excellent, but some are faint or badly reproduced. The small diagrams are usually clear, but the maps of large areas of country are on too small a scale. Although there is a full and analytical contents list, it is a pity that there is no index. The bibliography is full and most useful. Whilst it is naturally concerned mainly with Finland, there are various general books dealing with glaciation quoted, and consequently it is rather odd to see no reference to W. B. Wright's work.

Dr. Tanner is much to be congratulated on this book. It will give all who are interested in this fascinating country a clearer insight into its physiographical problems, and with its many illustrations it should appeal to others besides the professional geographer and geologist. J. A. S.

DIE ÅLANDS-INSELN IM OSTSEERAUM. By A-J. Grüssner. Schriften der Bremer Wissenschaftlichen Gesellschaft. Reihe C: Deutsche Geographische Blätter. Bd. 41, Heft 3–4. *Bremen: Franz Leuwer*, 1937. 9½ × 7 *inches;* 205–296 *pages; illustrations and maps*

This monograph owes much to the inspiration of Gräno's technique of regional analysis, and is indeed an attempt to assess the claim of the Åland archipelago to geographic individuality. In choosing the area for such a study the author has set himself a fascinating problem, for the thousand-island bridge between Sweden and Finland is in many respects a transitional belt between the two countries. Formal analysis of the landscape elements shows however that the

whole is in the main a pier-head of Finland rather than a true bridge, and reveals a significant regional contrast within the archipelago itself.

The author is ultimately led to divide the archipelago into two: Great Åland and the Scharengebiet (Skerry belt). The division between the two lies in approximately 20° 30′ E., and along the line of the comparative deeps of the Delet and Föglö fjord. To the west, Great Åland is a compact land area of eruptive rocks with predominantly deciduous woodland and some degree of independence in its economic geography. To the east lie scattered islands (land to water is as one to nine) of granite gneiss, with in the main coniferous woodland and a close dependence on Finland in economic life.

Summary treatment can hardly do justice to this study, which is a model of close reasoning and of material sifted and resifted until nothing remained which was not strictly relevant to the thesis. H. A. M.

LATVIA: country and people. By R. O. G. URCH. *London: George Allen and Unwin*, 1938. 7½×5 *inches;* 280 *pages; illustrations and map.* 3*s*

The main theme of the author is the early history of this little-known Baltic republic, its post-war achievement of independence, and its subsequent economic, social, and cultural progress. Under President Ulmanis, an agricultural pioneer as well as a politician, a series of agrarian laws has changed the basis of Latvia's economy. Of a total population of 1·9 million, nearly 70 per cent. are engaged in agriculture. As much as 16 per cent. of the land is said to be unproductive, but as the result of the division of many of the large estates, there are now more than a quarter of a million peasant proprietors. Crop yields, with the exception of flax, have increased, and wheat is now exported. The State forests are also a valuable asset, and timber is an important item in the trade between Latvia and Great Britain. Whereas three-quarters of the population are Latvian, the minority groups are composed of Russians (12 per cent.), Jews (5 per cent.), and Germans (3 per cent.), with a small number of Poles, Lithuanians, and Estonians living in the frontier regions. A few good descriptive passages, especially of the Daugava (formerly the Western Dvina), on which the city of Riga stands, and the abundant illustrations add interest to the book. It is unfortunate therefore that many of these have no title or explanatory notes, so that their function in relation to the text is purely decorative.

A. F. A. M.

BALTIC CORNER: travel in Estonia. By RONALD SETH. *London: Methuen and Co.*, 1939. 7½×5 *inches;* xii+234 *pages; illustrations and sketch-map.* 7*s* 6*d*

Estonia offers much of interest to an increasing number of visitors from Britain. Mr. Seth's book is a record of his personal experiences during over two years' residence in the Republic. Tallinn provides a wealth of evidence of its chequered history: its Danish fortifications dating from the thirteenth century, its houses and churches belonging to the days when Tallinn was a flourishing member of the Hanseatic League, its Lutheran churches established under the German regime during the Reformation, its Swedish bastions and Russian cathedral. Tallinn was eventually handed over to Peter the Great by the Swedes in 1710, and, as a usually ice-free port, it developed as an outport for Petrograd, and as an industrial city. During the Republic's twenty-one years of independence, the lot of the peasant has been greatly improved and illiteracy reduced. Estonia has her minorities: the Russians are concentrated near the frontier especially in the Petseri district and number 8·5 per cent., and the Germans in the cities account for 1·5 per cent. Swedes (0·7 per cent.) live mainly by fishing from the islands

off the coast, whereas the Jews (0·4 per cent.) are engaged in trade and industry in the cities. Poles, Latvians, and Finns comprise the remaining 0·7 per cent. Clear maps of Estonia are included as end-papers, and there are some illustrations in sepia tone, but the casual attitude of the writer and the degeneration of style towards the end, involving resort to a chapter of diary notes, are irritating features. A. F. A. M.

SCIENTIFIC RESULTS OF CAMBRIDGE EXPEDITIONS TO ICELAND, 1932–38 Edited by BRIAN ROBERTS. (Iceland Papers. Vol. I. 17 separates.) *London: Oxford University Press*, 1939. 10×7×1 *inches; illustrations and maps.* 21*s*

Within fairly easy reach of this country, Iceland provides an excellent training-ground for geographical and biological field-work. No similar area in Europe includes such an extensive range of problems of interest to students of the geographical sciences, while the fauna and flora of the island are sufficiently simple to make the study of ecology profitable. It is for these reasons that a number of small expeditions from Cambridge University have visited Iceland in summer during the last seven years. While training in field-work and organization has been the underlying purpose of these expeditions, a number of studies of real scientific value have been made. 'Iceland papers' is a collection of seventeen reprints embodying the more important scientific results of the Cambridge expeditions, with a preface by B. B. Roberts. Fifteen other papers are in course of preparation and are to form part of a second volume.

The collection begins with an account by B. B. Roberts of the 1932 expedition to Vatnäjokull, reprinted from the *Journal* (81 (1933) 289–313). This expedition made a double crossing of the great ice-cap, from south to north and back. The Kverkfjöll region was mapped, and ecological surveys were made of the lava desert to the north of the ice and of the coastal belt to the south. This is followed by a summary of the history of the exploration of the ice-cap. The ecological work is dealt with by F. W. Anderson and P. Falk. Apart from water supply and temperature, soil-movement (*i.e.* drifting lava particles) is shown to be a powerful factor affecting the distribution of plants on the central desert. Observations on the birds of the same region, with special reference to their feeding habits, are recorded by B. B. Roberts. He concludes that birds are not usually limited to their particular habitat by the fact that a special kind of food exists there in quantity. On the contrary, a bird will in general eat whatever kind of food it can obtain with the least difficulty in its own habitat. This is elaborated by D. Lack in "Habitat distribution in certain Icelandic birds." Knowledge of the gannet colonies of Iceland is brought up to date by Roberts. Six gannet colonies are now occupied, with an estimated total of 13,600 pairs.

A most interesting and comprehensive account of the island of Grímsey, North Iceland, and the life of its 115 inhabitants is given by D. B. Keith and E. W. Jones (*Geogr. J.* 86 (1935) 143–52), members of the 1934 expedition. The island is noted for the immense numbers of sea-birds which nest on its cliffs, and observations on these are recorded by Lack and Roberts, who visited the island in 1933, and by P. F. Holmes and D. B. Keith. At the beginning of June 1934 an earthquake destroyed the first laying of the birds on the cliffs of Grímsey. It is pleasant to note that though the islanders were able to collect only 600 eggs, instead of the normal 12,000, they refrained as usual from touching the second laying. The vegetation of Grímsey is described by E. W. Jones. The complete absence of all woody plants, such as the dwarf birch, is noteworthy, as these plants are abundant on the mainland.

The results of a study of Hagavatn, a lake formed by the retreat of the

Langjökull ice-cap, are put forward by J. Wright (*Geogr. J.* 81 (1935) 218–34). This lake has given rise to at least three floods, the latest in 1929. At long intervals the edge of the ice dams the outlet of the lake, and subsequent retreat and breakdown of the ice release a flood. The author concludes that a major flood will not occur in the next thirty years.

The remaining four papers are reports by specialists on collections made in Iceland. The spiders and mites are recorded with ecological notes by Professor W. Rae Sherriffs, the Collembola by Maldwyn Davies, earthworms by L. Cernsvitov, and freshwater algae by J. Boye Petersen. E. B. B.

DAYS IN OLD SPAIN. By GERTRUDE BONE. *London: Macmillan and Co.*, 1938. 9×5½ *inches;* xiv+260 *pages; illustrations (by Muirhead Bone) and map.* 12*s* 6*d*

Rarely indeed does it fall to the lot of a reviewer to comment upon such a book as this, and a proper appreciation of the drawings and text would pass beyond the scope of these pages because it is, primarily, a work of art. But it is also the record of a pilgrimage through Spain, starting in western Andalusia and passing thence northward right up to the Asturias and Galicia, with a detour to Cuenca and a few final notes on Cataluña. It deals, therefore, mostly with western Spain. The Bones are learned and sympathetic travellers, and they were evidently very much at home in the country. Their work is careful and precise, yet unpedantic, and because their response to what they saw was direct and strong, its expression is convincing. There is more than a hint that the writer, like the artist, did much of her work, or at least of her sketching, on the spot, but it has lost none of its vitality in the subsequent polishing. Gertrude Bone is concerned not only with art and beauty and fellowship, but most deeply with civilization itself. She writes of "the sensation which goes with one all the time through modern Spain, that one is seeing the last of things." And indeed, much of the Spain recorded in the book is already gone. It is no book for light and easy reading. The drawings and the prose are both for contemplation, and the book will last. Most satisfying of all its "days" are, perhaps, those in León, at Santiago de Compostela, the day at Trujillo, one at San Pedro de Nave: but it brings whole tracts of Spain to hand, the Spain we used to know. M. A.

BEITRÄGE ZUR ITALIENISCHEN VOLKSKUNDE. By FERDINAND HERRMANN. (Heidelberger Akten der von Portheim-Stiftung, 23.) *Heidelberg: Carl Winter*, 1938. 10×7 *inches;* viii+80 *pages. M.*4.50

This short account of Italian spring festivals resulted from a four-months' stay in Italy, and is remarkable for the lucidity of its language and for the author's grasp of essentials. The emphasis is largely on the south, where ancient customs have been more tenacious than in the north, but the survey takes in all Italy save Sardinia, and, when the author was not able to witness the ceremonies himself, is based on eye-witnesses' accounts. It was impossible for him to confine himself to strict survivals of pagan celebrations, since in Italy it would be difficult without further research to distinguish them from others that have been taken over by the Church. Dr. Herrmann begins with an excellent section on the characteristics of the Italian people: the contrast with north Europe is well brought out by a comparison between *Natale* and *Weihnachtsfest*. He then describes the ceremonies associated with festivals from March (survivals of ancient New Year celebrations) through Easter to May. He is perhaps best on the May festivals, but was evidently impressed by Easter, when feeling reaches an intensity not easily guessed at in northern climes. He concludes with an appeal for further historical investigation—especially necessary when local

usages vary so much—into Italian folklore; his bibliography and his account of previous studies show that he is well aware of what has been done by his predecessors. In some final remarks on northern and eastern influences on Italy, he compares the Mediterranean, with its matriarchal culture, to a "fruchtbaren Mutterschosse" destined "von aussen her [*i.e.* from the north] befruchtet zu werden." J. P. H. M.

ASIA

LA NUOVA TURCHIA. By ETTORE ROSSI and others. (Il mondo d'oggi.) [*Roma*]: *Edizioni Roma* (1939). $8\frac{1}{2} \times 5\frac{1}{2}$ *inches;* 160 *pages; illustrations and railway map.* L.10

Although somewhat superficial in parts, the four monographs which form the contents of this little volume give a good general idea of the metamorphosis which Turkey has undergone within the last fifteen years. In a brief historical survey, Professor Anchieri discusses the causes of the decline of Ottoman prestige from the close of the seventeenth century onward, and relates the post-war events which hastened the climax. His analysis of Kemalism, showing some of the respects in which it differs from Fascism, is specially interesting. Professor Migliorini's contribution, "Land and inhabitants," describes the principal geographical features and climatic conditions of each region, divides the population into ethnographical groups, and makes a careful study of the present economic position. Turkey's future prosperity will largely depend on the extent to which agriculture can be developed, and the Government is making strenuous efforts in this direction. At present, wide areas suitable for agricultural purposes still remain uncultivated. Nevertheless, the reforms introduced in order to ensure a bigger yield from the soil have already given appreciable results. For instance, wheat is now grown in sufficient quantity to supply the needs of the home market and leave a surplus for exportation; and the cultivation of beet has considerably reduced the imports of sugar. The trade figures and other statistics contained in this section point to increasing prosperity. In his interesting study of the intellectual life of the nation, Professor Rossi suggests that some of the educational reforms have given disappointing results: "The change of alphabet has increased the number of those able to read and write, but it has not added to the number of readers or authors. . . ." What Professor Nava has to say about Turkey's foreign policy would indicate that, while she is anxious to keep on good terms with every one, she will not tolerate interference in her domestic affairs. In spite of her cordial friendship with the Soviet Union, communistic propaganda is strictly prohibited within her frontiers. F. M. M.

WE MARRIED AN ENGLISHMAN. Written and illustrated by RUTH and HELEN HOFFMAN. *London: Robert Hale,* 1939. $9 \times 5\frac{1}{2}$ *inches;* 300 *pages; illustrations.* 12*s* 6*d*

Near the small township of Ali al Gharbi, in the heart of the Bani Lam country, the Tigris, flowing almost due east from Kut, approaches its nearest to the mountains of Luristan and then bends at right-angles towards the south. It was obviously the most favourable site for the operations of the Englishman who had contracted to supply half a million tons of gravel and sand for the construction of the Kut barrage, opened on March 28 of this year. On to the small hive of industry that sprang up round the gravel contract, 18 miles of railway, quarries, elevators, washers, hoppers, barges, and the rest, descended the American twins, pencils and paint-boxes in hand, bursting with the joy of life and determined to make the most of every minute of their first experience of

the East. Pashas, shaikhs, shepherds, boatmen, gipsies, dusty roads, broken-down cars on rainy nights miles from anywhere, all became part and parcel of the same huge joke. But the high spirits that pervade the book should not be allowed to obscure its more serious merits. The authors can paint quite a good picture with words as well as with their brushes, while their gift of human sympathy has enabled them to collect a store of information regarding the customs, beliefs, and mental processes of some of the humbler inhabitants of 'Iraq. The pen-and-ink sketches are amusing. C. J. E.

NEUE QUELLEN ZUR ZWEITEN INDIENFAHRT VASCO DA GAMAS. By CHRISTINE VON ROHR. (Quellen u. Forschungen zur Geschichte der Geographie u. Völkerkunde, Band 3.) *Leipzig: K. F. Koehler*, 1939. 9×6 *inches;* viii+108 *pages; maps and facsimile MSS. M.*10 (*unbound M.*8)

In this work Dr. Rohr publishes a manuscript recently unearthed by her in the Nationalbibliothek at Vienna. The manuscript consists of an original account in Portuguese of Vasco da Gama's second voyage to India and a hitherto unknown German account of the same journey composed by a German member of the party. In addition to printing the texts in full, along with a translation of the Portuguese version, the work contains a further record of the voyage by an eye-witness named Thomé Lopes; this is here rendered in German for the first time. While these new sources can hardly be said to possess exceptional value, they will be welcomed by students of the Age of Discovery as offering useful and suggestive material for a definitive study of da Gama's life-work. The active participation of a German in this second voyage is particularly suggestive; it would seem that Martin Behaim's return to Nürnberg in 1490 did much more than arouse academic interest in world discovery. In a short prefatory note Professor Eugen Oberhummer touches on the cognate subject of early German contact with India, but he is rather more concerned with bibliography than history.

Professor Albert Herrmann rounds off this useful little work with an appendix on "Ophir and the Gold-land near Sofala" (the excuse for resuscitating this venerable controversy is supplied by a reference in the Lopes narrative to South African gold-mines); but it is doubtful if his thesis will command wide acceptance in this country. The possibility of locating Ophir on or near the Oman coast of Arabia is not even mentioned.

Throughout, the textual annotations are clear and scholarly, and worthy of the standard set by earlier publications in this series. The volume is adequately illustrated and indexed. G. H. T. K.

REGIONALE GEOLOGIE DER ERDE. Edited by K. ANDRÉE, H. A. BROUWER, and W. H. BUCHER. Band 1. Die alten Kerne. Abschnitt VI. The Indian peninsula and Ceylon. By G. DE P. COTTER. *Leipzig: Akademische Verlagsgesellschaft*, 1938. 10×7 *inches;* 66 *pages; maps and profiles. M.*16.80 (*inc. Abschnitt VII*)

To summarize the geology of the Indian peninsula and Ceylon within the compass of sixty-six pages is a task that involves skilful selection of literature. Dr. Cotter has succeeded both in his choice of material and in achieving a proper objectivity. His account is a review of recent progress in the study of Indian geology and, though he still inclines to views which have been effectively proved to be erroneous, his summary helps at least to focus attention on the modification of opinions which in the course of years have tended to become dogmas.

In 1904 T. H. Holland suggested a new grouping of the geological eras into Aryan, Dravidian, Purana, and Archaean. The term Purana was considered

by him to include those unfossiliferous rocks above the Eparchaean interval which rested more or less gently upon the folded schists and gneisses of the Archaeans. Being unfossiliferous, the rocks were thought to be in the main pre-Cambrian, and to correspond therefore to the Algonkian. This definition has since required some modification. It has been found by Heron in Rajputana that the rocks of the Raialo and Delhi systems (Purana) are folded and highly metamorphosed, more so in parts of the Aravalli orogen than the adjacent Archaean rocks. A comparable phenomenon occurs in the Alps, where the Mesozoic *Buendnerschiefer* locally attain a higher degree of metamorphism than older rocks belonging to a different tectonic unit. In Rajputana there are three major unconformities, and it is difficult to be certain which represents the Eparchaean interval. It is doubtful moreover if the Purana era corresponds closely to the Algonkian, for the Vindhyan system, in the opinion of Vredenburg, Fox, and Auden, probably extends in age as far as the Cambrian. Cotter retains the Vindhyan system in the Purana or Algonkian era. Recent work in the Himalaya also gives strong reason for considering many of the so-called Purana rocks to be Palaeozoic in age.

Concerning the geology of the Archaeans and later formations, Dr. Cotter draws attention to most of the important points, as far as space permits. The chapter on the Archaeans alone contains five maps. His summary of the Archaeans and the Puranas of the peninsula is clear and concise, and he has also attempted the difficult task of correlating the different outcrops. It may be noted that although considerable progress has been achieved by the Geological Survey of India in the study of the Archaeans, their correlation, in view of the varying degree of metamorphism suffered by the rocks, is still partly conjectural.

Under the "Vindhyan system" Dr. Cotter draws attention to the interesting forms described by Chapman as *Fermoria* and *Protobolella*. He does not mention the later views expressed by M. R. Sahni, who casts doubts upon the brachiopod affinities of these fossils and assigns them to a new family, the Fermoriidae, of unknown affinities.

Chapter III, dealing with the Palaeozoic and Mesozoic evolution, is an admirable summary of the Gondwana system of rocks and of the Cretaceous system in southern India. The importance of the Umaria fauna is rightly stressed. The absence of reference to the work of K. P. Sinor, who discovered the Umaria Marine Fossil Bed, described by W. D. West as "the most interesting discovery in Gondwana geology," is perhaps due only to an oversight. Dr. Cotter's inclusion of the Deccan Trap and Intertrappeans in this section shows his leanings, though somewhat qualified, to the Cretaceous age theory of the Deccan Trap, in spite of recent evidence to the contrary. The absence of any reference to the work of Hislop, who proved the Tertiary age of the Deccan Intertrappeans as long ago as 1860, both on the basis of the plant and animal fossils, is a notable omission. On the contrary, particular reference is made to the supposed occurrence of *Bullinus prinsepii*—the leading species of the Deccan Intertrappeans—in the Cretaceous rocks of Baluchistan. M. R. Sahni has shown recently that this occurrence, although accepted by Holland, is extremely doubtful and cannot be relied upon. This species has never so far been found in Cretaceous sediments. The supposed *prinsepii* from Baluchistan was never figured, nor are any specimens of it traceable. Dr. Cotter is perhaps even less cautious in referring to "the angiospermous fossil wood (*Homoxylon rajamahalense*)" as having come "from the Rajmahal Plant Beds," when both the horizon and the locality of this specimen are in doubt: a fact with which Dr. Cotter is probably familiar, in view of his long association with Indian geology as a whole and the Gondwana system in particular.

The fourth chapter, containing three maps, summarizes the account of the Tertiary and recent deposits, and more information has been condensed into a few pages than one would have thought possible. A brief reference to recent work dealing with the discovery of stone implements and other evidence of the existence of ancient man in this region would have made the chapter more complete.

In spite of certain notable omissions and the importance assigned to the older and more orthodox views, which in some cases have been shown to be erroneous, this brochure constitutes an admirable and commendable summary of Indian geology. M. R. S.

CEYLON. By Lord HOLDEN. *London: George Allen and Unwin*, 1939. 9×5½ *inches;* 316 *pages; illustrations and map.* 10*s* 6*d*

This book is the fruit of the writer's recent visit to the island. The second part is devoted to five Pleasant Journeys, brief sketches of excursions arranged to cover the chief centres of interest in the country. With unusual courage he admits "the hideous appearance" of a tea bush and that "the average tea factory is a disconcerting if inevitable eyesore in this fine country." The visitor with a limited amount of time at his disposal will find this section a useful supplement to the pamphlets issued by the local tourist bureau in fixing up his programme. The writer's warm appreciation of the rest houses available on these routes provides the necessary corrective to his amusing special chapter on those maintained at the public expense out in the wilds.

Of the more pretentious first part, seventy-three pages are occupied by a description of the often-described Lost Cities and Buddhist Temples, about which Lord Holden has little new to say. One wonders why he concluded that the exquisite Sigiriya frescoes of women were the work of Buddhist monks "as if wishing to recapture the hedonistic spirit of their predecessors." It would have been safer to leave Oriental art alone; the head of Vihara Devi, at Ruwanweli Seya, on the beauties of which he rhapsodizes (p. 123), is not, as might be implied from the text, of ancient origin, but a very recent concoction. There is a readable chapter on the jungle, but the writer has confused the comparatively innocuous red ant which nests on trees with the ferocious red ant which burrows underground; and it is not clear why he describes the deadly Russell's viper, which is known to exceed 4½ feet in length, as "diminutive." His plea against "the callous persecution or fruitless destruction of animal life" will be appreciated by the Sinhalese who have inherited the Buddhist instinct.

The writer is not happy when dealing with the history of Ceylon. For instance all the four dates given on pp. 90 and 92 are wrong, while to say that the Dutch captured Colombo in 1658 (p. 94) is as bad as to ascribe the fighting at Hanwella to 1815 or the deposition of the last King of Ceylon to 1816. What is the justification for charging Bishop Heber's wife with delaying nineteen years before writing her 'Journal' of her visit to Ceylon in 1825 (p. 14), when she has expressly stated in the Preface to Heber's 'Narrative' that the 'Journal' was a contemporary record? That lady, if still alive, would be surprised to learn that she attended state functions at the Sinhalese Court (p. 269), which had ceased to exist ten years before her visit. Her surprise will be equalled by that of Maria Fawkes, of Farnley Hall, Yorkshire, wife of Sir Edward Barnes, on learning that Mount Lavinia was called by that "beautiful name" after her (p. 221). Their surprise will probably not surpass the consternation of the god Siva, on finding himself described as a female (pp. 241, 294). The book is marred throughout by similar erroneous statements, which in many instances cannot be ascribed to mere carelessness or slip-shod observation. Many names have like-

wise received hard treatment in the printing. *Vehera*, stupa, is frequently confused with *Vihara*, monastery. The book contains a serviceable map, and thirty-two plates, some of which are good. P. E. P.

SIBERIAN MAN AND MAMMOTH. By E. W. PFIZENMAYER. Translated from the German by MURIEL D. SIMPSON. *London: Blackie and Son*, 1939. 9×6 *inches;* xii+256 *pages; illustrations, maps, and plans.* 12*s* 6*d*

Man and mammoth, as the title states, share this book, and since the mammoth dates from several thousand years ago, one cannot complain that the studies of man are from some thirty years ago. Mammoth ivory for long has been a trade commodity in Siberia and has found its way all over Asia for several centuries. A hundred years ago as much as 120,000 lb. a year were marketed, and most of it came from the New Siberian islands. But the salvaging of mammoth carcases is a newer undertaking. Cave drawings in Europe had familiarized explorers with the appearance of the animal before actual discoveries of specimens, which began at least in the eighteenth century. In a map accompanying this volume, the sites of twenty-one finds of mammoths are recorded in Siberia. The author was commissioned in 1901 by the Russian Academy of Science to excavate and bring back to St. Petersburg a carcase discovered on the banks of the Berezovka river, a tributary of the Kolima river in eastern Siberia. In 1908 he went again in search of another find, this time east of the Yana mouth on the Arctic coast. His first venture was the more successful, for although wild animals had devoured parts, much of the carcase was excavated and brought back, frozen first by climate and later in refrigerator cars, on the Siberian railway to Europe. So fresh were parts, for the animal was partly preserved in ground-ice, that the source of the last and only partly digested meal could be analysed and the species of plants determined. The journeys are described in detail with much information about the habits of Lamut, Yakut, and other tribes, as well as details of the Cossack and trading stations as they were in Tsarist days when political prisoners were numerous and before the reforming hand of Soviet enterprise had touched Siberia. The most valuable part of the book however is the very full account of the mammoth in all its aspects: in this respect it is of lasting value. It has many illustrations, a good map, and full index. R. N. R. B.

[REGION OF PERPETUAL FROST.] By K. I. LUKASHEV. [In Russian.] *Leningrad:* [*State University*], 1938. 9×6 *inches;* 186 *pages; illustrations and maps.* 6 *roubles*

This book deals with two problems: the nature, origin, and the geographical distribution of the regions of permanently frozen subsoil in Siberia; and the rational construction of buildings, roads, and other engineering structures in those regions. Generally speaking in such regions one can distinguish an upper "active" zone which is affected by seasonal variation of temperature and an underlying permanently frozen zone. The thickness of the active zone varies with the geographical position and the nature of the ground from a fraction of a metre to 4 metres. The thickness of the frozen zone also varies from a few metres to over 274 metres (Amderma, North Siberia). Frozen subsoil occurs in northern and eastern Siberia. A map (Fig. 13, p. 40) shows the limit of the frozen ground extending from the White Sea in an easterly direction, turning southward along the river Yenisei, and then from the headwaters of this river along the Russo-Chinese border towards the mouth of Amur. On the other side of the Sea of Okhotsk it crosses central Kamchatka.

The book contains a detailed account of the physical structure of the frozen ground, of the physical and climatic conditions determining the formation of

ice-lenticles and ground-ice, of the effects of the summer thaw and winter freezing, of the effects produced by frost-heave and the movement of quicksand, and of the influence of these phenomena on the physical features of the country (landslides, slumping, formation of swampy tundra, decay of forest vegetation).

The different regions of Siberia affected by frozen ground conditions are described in detail. The climatic factors favouring their formation are the long and cold winter season with the short, and relatively cold, spring, summer, and autumn; the small amount of precipitation; and the low average annual temperature (usually below freezing-point).

The effects produced by frost-heave, slumping, subsidence, and by slipping of the ground affected by frost are discussed in great detail. Methods of rational construction of foundations for houses and roads are outlined. The writer makes certain general recommendations, as for instance that in regions of intense frost foundations should be constructed to preserve the surrounding frozen ground, whereas in regions of less intense frost the elimination of frozen ground is advised, unless the subsoil is composed of quicksand. Piles or stone pillars are recommended for foundations in all cases. Measures dealing with the prevention of road subsidence and sliding are also outlined.

The book is intended primarily as a practical guide for builders and engineers working in these regions. Within its limits it is excellent, but its deliberately restricted outlook makes it tantalizing to the scientist who would welcome more about the structure and mode of formation of frozen ground. In this connection accurate temperature measurements of deep bores would be invaluable. A problem which immediately presents itself is the sparse glaciation of northern Siberia at the present time, in spite of the immense development of frozen ground. Is it due to the low amount of precipitation during winter months, or to the rapid evaporation of snow, or to some other cause?

The book is well documented, with a bibliography of 142 items, mostly Russian. S. I. T.

AFRICA

AFRIQUE ÉQUATORIALE, ORIENTALE ET AUSTRALE. By FERNAND MAURETTE. (Géographie Universelle. Edited by P. VIDAL DE LA BLACHE and L. GALLOIS. Tome XII.) *Paris: Armand Colin*, 1938. 11½×8 *inches;* 398 *pages; illustrations and maps.* 150*fr.*

This volume of the Géographie Universelle was published after the death of its author, who was Director of the French and International Labour Bureaux. Fortunately M. Maurette had corrected the proofs and arranged the illustrations and maps, so that it forms a completed work and a fitting conclusion to a life of distinguished scholarship. The author might have made further corrections in the final proofs if he had lived to see them, but it was decided to leave the text as M. Maurette himself left it.

The book falls into six parts, and in each section the general method of treatment is that followed in the series as a whole: a brief glance at the general features of the region, followed by a detailed description and analysis of the structural, physical, climatic, and economic features, with chapters on any special features of the region under examination. In the present volume the treatment throughout is balanced and exact, giving a satisfying account of each region and throwing light on the interrelationship of the regions in the various parts of the continent.

In the first part, on Equatorial Africa, the latest researches on the structure and physical features of "L'Afrique du milieu" are set forth with remarkable

clarity, great stress being laid on the evolution of the Congo basin, which is regarded as a lake basin formed by subsidence in mid-Mesozoic times, after the deposition of the Lualaba–Lubilash Beds. As a result of the mid-Cretaceous foundering of the southern Atlantic basin a coastal stream cut back through the barrier of the Crystal Mountains and tapped the lake, giving it its present outlet to the sea. The rivers of the Congo basin are therefore shown as having three *paliers*, or levels: the basin rim, the upper floor of the basin, and the present lower floor. Most of the rapids and falls in the courses of the rivers occur between the rim and the upper floor of the basin, or between the upper and lower floors. The estuary of the Congo is regarded as a surface-formed feature, drowned during the post-Miocene subsidence of the coastal belt.

The human geography of Equatorial Africa is treated both from the cultural and the economic aspects. The Bantu are divided into Forest and Savanna types, and the influences of the two environments are reflected in their *humeur* and their cultural conditions. The Forest Bantu are described as "restless, distrustful, rather dull, and aggressive," whereas the Savanna Bantu are regarded as relatively pacific and genial; the temperamental differences are attributed to the easier life of the upland savanna regions and to the greater intensity of sunlight and the greater facility for communication and social intercourse. A real response to the environment is said to be clearly recognizable: "In a good environment [the Bantu] becomes a good worker," and "fundamentally the Bantu society is vague in its traits and mobile in its constitution." Stress, too, is laid on the biological environment, and in particular on the necessity of relentless war against the tsetse fly. One could have wished perhaps for a more detailed consideration of the climatic effects upon human life in Equatorial Africa, but the author perhaps felt himself too limited by space to indulge in such specialized considerations. The economic conditions of the region are analysed in detail.

In East Africa the author recognizes two outstanding geographical facts: the region is oriented towards the Indian Ocean and is therefore "un pays de caractères maritimes." It also contrasts with Equatorial Africa in that it is divided naturally into relatively small compartments by tectonic features, which are described in detail. The view is expressed that the island-mountains of East Africa were formed in a period of desert climate during the Mesozoic, a view which seems to be now unpopular with geomorphologists who have had first-hand acquaintance with such features. The influence of the climate is related to the life of the European and native inhabitants of the region, and the author adopts Stuhlmann's theories on the origin of the Bantu and Half-Hamites of the plateau. In particular, the influences of Persian, Arab, and Indian traders on East Africa are brilliantly analysed.

In north-east Africa the author evidently felt a difficulty at the time he wrote because of the radical changes following the Italian conquest of Abyssinia. Consequently the chapter on "L'Éthiopie et la colonisation européenne" is limited to the pre-Italian period and mainly to Eritrea and the Somalilands. It is interesting to find French Somaliland described as "neither a colony of settlement nor a colony of exploitation: it is, strictly speaking, a station, an entrepôt, and a port," and the Djibouti railway "a bridge thrown between the Ethiopian fortress and the great modern commercial routes." Eritrea is described as a colony of exploitation, suitable for settlement by southern Italians, but the possibilities of European settlement on the Abyssian plateau are, perhaps wisely, unconsidered.

It is the portion of the book dealing with southern Africa which throws into bold relief the rapid advances in science made in this part of the continent. In

the last few years a new topographical map of the Union has come into being and developments in our knowledge of the climate have been steady. Any author not actually in touch with South Africa is bound to be therefore at a serious disadvantage in treating this part of the continent. In broad outline the regional treatment of South Africa is sound and the human aspects are adequately considered, but there are several points of detail in the book with which most South African geographers would strongly disagree.

In the description of the Great Escarpment, for example, it is definitely wrong to include the Lebombo range as a part of that feature, nor does the Roggeveld extend to the Orange river valley (p. 250). And in the description of the climatic processes few would agree with the author's conception of the "winter monsoon" (pp. 255, 287). The map (Fig. 76) showing mean annual rainfall is too general to be of any value for South Africans, and indeed some of the statements with regard to total annual rainfall in the eastern part of the Union are not in accord with the latest publications of the Union Meteorological Office. In the map showing the hydrography (Fig. 79) the region with no drainage to the sea should surely include the Cuvelai basin and the Etosha pan, and Region 3 in the same map seems to flatter these rivers beyond all the bounds of honesty. Rivers such as the Molopo, the Swakop, and the Kuiseb can scarcely be said to have water during a great part of the year.

The map of the Cape ranges (Fig. 84) is incorrect in several details, particularly in the position and arrangement of the Langeberge and the Zonder Einde range. In the same map the trend of the Great Escarpment is misleading and the position of the Sneeuwberge is wrong. On the opposite page (p. 282) the section from the coast to the interior shows the Swartberge as about 500 metres lower than the Great Escarpment in the Koms Berg, whereas the latest survey shows it to be considerably higher than the Koms Berg. In Fig. 86, too, a section through the gold-bearing beds of the Witwatersrand shows Heidelberg to be much higher than Johannesburg, whereas in fact it is nearly 1000 feet lower.

Nor has the author made clear the difference between High Veld and Middle Veld. The idea that Middle Veld exists in the south-western Transvaal is no longer held by South African geographers, nor would any South African agree to calling the Witbank coal-bearing area Middle Veld. It is unquestionably High Veld. If there has been a misconception about these matters it is probably connected with the complete omission from the bibliography of all reference to the papers published in the *South African Geographical Journal*, which have been clarifying climatic and topographic features in the Union during the twenty-two years of the *Journal's* publication.

On the human and economic side however the author has given an excellent account of South African conditions, from the point of view of both European and native development. He has recognized the difficulties connected with agriculture in the sub-continent and concludes that "Le farming n'est pas l'avenir de l'Afrique australe: il est son présent, bien vivant." South Africans, realizing the huge sums devoted to the subsidizing of agriculture in the last decade, will hope fervently that there may be some truth in the exact opposite of this statement.

The illustrations and maps are of the usual excellence which has come to be associated with the Géographie Universelle, and the whole work represents a great advance in our knowledge of Africa south of the Sahara. Geographers owe a great debt to the late M. Maurette for this comprehensive and illuminating account of the various African environments. J. H. W.

FRONTIERS OF ENCHANTMENT: an artist's adventures in Africa. By W. R. LEIGH. *London: George Harrap*, 1939. 9½×6½ *inches; 286 pages; illustrations.* 10*s* 6*d*

One of the features of the America Museum of Natural History in New York is the series of displays illustrating the larger animals of Africa in the African Hall. The planning of these groups and the acquisition of the material for building them up was placed in the hands of the late Mr. Carl Akeley, who spent many years in the African wilds in the service of the museums of Chicago and New York. It was at his invitation that the author, a young American artist, visited Africa in order to paint the scenery and background for the groups which Akeley had planned. This was Akeley's fifth expedition to Africa in 1926, and it was during this trip that, worn out with his exertions and hardships, he died at the camp on the saddle between the volcanoes of Mikeno and Karisimbi.

Mr. Leigh writes chiefly of the scenery and of the larger animals which he met with in the various localities selected by Akeley to form the background of his groups. The first of these stations was in the Lukenia hills, overlooking the Athi plains with their teeming herds of antelopes and not very far from Nairobi. Here he had many adventures with baboons, klipspringers, and a 12-foot cobra. The camp was then moved to the northern Waso Nyiro, where the background for a water-hole group was painted with giraffe, elephant, eland, and other antelopes. But perhaps his most interesting experiences were on the slopes of Mount Karisimbi in the Kivu district of the Belgian Congo, where the background for the gorilla group was obtained. His account of the Kivu gorillas, which he had considerable opportunities of observing, is of special interest, as not many people have been able to spend so much time among them. After the death of Akeley, Mrs. Akeley took charge of the party, which returned to Lake Hannington in Kenya to obtain the material for the group of the Greater Kudu.

This can hardly be called a travel book, but it contains an artist's vivid impressions of African scenery and African animals, and is illustrated with scenes of wild life reproduced from pen-and-ink sketches by the author. They contribute largely to the interest and the value of the volume. W. L. S.

NORTH AMERICA

THE LAWLESS ROADS: a Mexican journey. By GRAHAM GREENE. *London: Longmans, Green and Co.*, 1939. 9×5½ *inches; 306 pages; illustrations and route-map.* 10*s* 6*d*

Some of Graham Greene's previous work has been so brilliant that no one acquainted with Latin America could fail to be interested in his view of the Mexico of early 1938. He wished to see for himself the results of religious persecution, and particularly in the extreme south. As a Catholic, he sought facts regarding religious conditions in the States of Chiapas and Tabasco, regions of the Isthmus of Tehuantepec where roads are scant and poor, and where aircraft now help to solve the four-centuries-old problem of communication.

He entered Mexico by way of Laredo, Monterrey, and San Luis Potosí, where he visited the *caudillo*, General Cedillo; and he remained in Mexico City long enough to become sardonic concerning modern manifestations. The Catholic situation in and near the capital he found hopeful and, despite prohibitions and expulsions, fairly secure. But when Mr. Greene travelled southwest, in a variety of conveyances and accompanied by a multiplicity of dismal experiences, to Chiapas and Tabasco, he found conditions that troubled him profoundly: the tale of destroyed churches, of priests banished or functioning

in disguise, was illuminated by the account of new magic-working saints, talking from little boxes, advising certain patent medicines, and adored by thousands of peasantry. All this, the author thinks, is one result of the suppression of normal religious observances.

Mr. Greene's itinerary in Tehuantepec isthmian regions took him to Frontera, Palenque, Yajalon, Tuxtla, and a town or so of Oaxaca; he visited, cursorily, the Maya ruins of Palenque and the Zapotec temples of Mitla, in the same spirit of indifference with which he regarded the stupendous remains at San Juan Teotihuacan. He considered, in the latter, that the "mathematical sense had run riot," so that he quite expected to see Q.E.D. written on the paving of the Great Court. He saw Mitla's decorations as "a kind of cross-stitch in stone," and the frescoes as "part of an uninvented horror, a mechanistic world." He disliked even more actively Mexico's show village, Taxco; and thought Puebla the only Mexican town where he could live with "some happiness." Perhaps this critical attitude is partly due to determination to avoid the beaten path not only of the tourist but of touristic admiration. Mr. Greene was often ill, and frequently angry; but he observed and recorded with such precision and vivacity that the people he met become live people, and the places are rendered visible. The illustrations are good and new. L. E. J.

CENTRAL AND SOUTH AMERICA

SOUTH AMERICAN EXCURSION. By ERNEST YOUNG. *London: Edward Arnold and Co.*, 1939. 9×6 *inches;* 368 *pages; illustrations and maps.* 18*s*

The author made, recently, a tour of South America that began with the easterly part of Brazil; thence, by way of the lakes of South Argentina and Chile, to the Pacific border, and so to the cities of the Central Chilean valley, to the northerly nitrate camps, and onwards to Peru, to some parts of Ecuador and Colombia, and back again *via* the Magdalena river to well-known ground.

Mr. Young is rather a heavy-handed writer and, notably in the first chapters, his information is not always accurate. The best part of the volume is that, from p. 295 onwards, describing the final journey from Quito to the coast at Barranquilla, Colombia. Here Mr. Young was no longer supplied with official statistics, and relied chiefly upon observation. The book is liberally illustrated and well equipped with sketch-maps. L. E. J.

SCIENTIFIC RESULTS OF THE OXFORD UNIVERSITY EXPEDITION to British Guiana in 1929. (British Guiana Papers [31 separates under one binding], by Major R. W. G. HINGSTON and others.) *London: Oxford University Press, for the Oxford University Exploration Club*, 1938. 10½×7×1½ *inches; illustrations and map*

This volume consists of reprints of papers describing the results to date of the Oxford University Expedition to British Guiana in 1929. The expedition consisted of twelve members led by Major Hingston, whose paper to the Society, delivered in May 1930, is the first reprint in the volume. There are 30 other papers, 20 of which deal with botany, 3 with ornithology, and 7 with insects. It is obvious from this first instalment that the method chosen by the expedition of intensive survey of a small forest area has been abundantly justified, from both the ecological and the taxonomic point of view. Many other expeditions, which ranged over a much greater area of country and cost three or four times as much, have achieved less valuable scientific results. All those interested in the biology of tropical South America will look forward to the publication of further results as soon as possible. J S. L. G.

AUSTRALASIA AND PACIFIC

THE AUSTRALIAN ABORIGINES: how to understand them. By A. P. ELKIN. *Sydney and London: Angus and Robertson*, 1938. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches;* xiv + 262 *pages; illustrations and map.* 8*s* 6*d*

The physical characters and manner of life of the natives are dealt with very briefly by Professor Elkin, as he is concerned with the social and religious life of the aborigine, which has not been understood by the governments, missionaries, or educational authorities. "We must know," he says, "the fundamentals of his tribal, local, and social organization; his conception of relationship not only to his fellows, but also to the land which is his home; his philosophy of life; his religion and magic; his ritual and mythology. . . . In gaining this knowledge, we shall at the same time understand the significance of some of the changes wrought by the coming of the white man." This book is an earnest endeavour to contribute to this understanding; at the same time, apart from its practical intention, it serves as a survey of the essential aspects of the incorporeal life of the natives which will prove very useful to students. Professor Elkin lays stress upon the secret life of the aborigines, a life of ritual and mythology, of sacred rites and objects, which can only be entered into by a series of more or less elaborate initiation ceremonies. Their philosophy has three characteristics; it is spiritual, totemistic, and historical, and is usually all three at once. The spiritual is totemistic in nature and historical in reference. Totemism implies that there is a common life shared by man and nature; mythology says that this life is a personal or quasi-personal one. The aborigines have a view of life and nature, more or less logical and systematic, granted its animistic premises, which guides their actions, is a source of strength in the present life, and teaches that personality is beyond space and time. How very different is this appreciation of native philosophy from the popular opinion that the Australian aborigine is a stupid and degraded savage. Professor Elkin even goes so far as to say that "The aborigine has, in fact, developed the art of contemplation to a much greater degree than most of us."

Mrs. Daisy Bates in her recent book, which was noticed in the *Journal* for March 1938, p. 268, also emphasized the spiritual aspect of the life of the aborigines, and she, like Professor Elkin, is greatly concerned with their present condition. Many attempts have been made by the various governments to ameliorate these conditions and to prepare the natives for contact with European civilization, but these have mostly been futile owing to the ignorance of those concerned, and in most cases they have come too late. At present a more determined effort is being made by the Federal Government, more especially with regard to the natives of Arnhem Land. The problem is a difficult one and it is to be hoped that it will be so solved as to be of permanent benefit to the natives and half-castes. A. C. H.

POLAR REGIONS

GREENLAND JOURNEY: the story of Wegener's German Expedition to Greenland in 1930–31 as told by members of the expedition and the leader's diary. Edited by ELSE WEGENER, with the assistance of FRITZ LOEWE. Translated from the 7th German edition by WINIFRED M. DEANS. *London: Blackie and Son*, 1939. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches;* xviii + 296 *pages; illustrations and maps.* 12*s* 6*d*

The English public has had to wait seven years for its version of Alfred Wegener's 'Letzte Grönlandfahrt' (see *Geogr. J.* 84 (1934) 515), but this want is now well satisfied by an admirable and eminently readable translation; it is

attractively produced and, by omitting a few of the earlier edition's photographs, it gains rather than loses, for now they are well reproduced on an adequate scale. It gives a full and vivid account of the late Professor Wegener's heroic expedition to Greenland in 1930–31 in the form of personal reminiscences of the various members of his large party; they write in an interesting and non-technical way about their scientific investigations, although inevitably at the expense of a certain amount of duplication.

The main object of the expedition was to maintain a station for a year near the centre of the ice-cap about latitude 71°, taking complete glaciological and meteorological observations which could be compared with those at stations near the east and west coasts, the latter being also the main base camp. For transport over the glacier slopes Wegener used Iceland ponies and, on the ice-cap itself, Greenland dogs to supplement two experimental motor sledges driven by air-screws. Owing to the unreliability of the latter during the first season it was not possible to provision "Eismitte," the central station, as generously as had at first been intended. However Sorge and Georgi decided to spend the winter there with what little they had, but, owing partly to a misunderstanding and partly to the leader's desire to see that all was well, a dog-sledge party set out on September 21 to relieve them; in fact, it resulted in the badly frost-bitten Loewe having further to burden their slender resources until the following March, while Wegener and the Greenlander Rasmus Villumsen tried to return to the base. But the season was too far advanced, and both perished in the attempt. Rasmus was never seen again, and Wegener's body was found in May 1931, after which the rest of the expedition continued the work already begun and made seismological determinations of the thickness of the ice-cap. R. M.

PHYSICAL AND BIOLOGICAL GEOGRAPHY

GEOLOGY: principles and processes. By WILLIAM H. EMMONS, GEORGE A. THIEL, CLINTON R. STAUFFER, IRA S. ALLISON. Second edition. *London: McGraw-Hill*, 1939 (*first published in* 1932). 9×6 *inches;* xii+452 *pages; illustrations and maps.* 21*s*

That this admirable text-book has reached a second edition in less than six years is an indication that its many excellent features are widely appreciated. It provides a very lucid account of geological principles, and it gives a sound treatment of the various processes. The book is clearly written, but it also gains greatly from the illustrations, which include well-reproduced photographs and diagrams, many of them new to this edition. Most of the diagrams are very convincing, the abundant three-dimensional sketches being a most helpful feature. As 468 figures are included there is ample illustration for the reader who studies the subject without close guidance. As would be expected, the areas chosen for illustration have been drawn chiefly from America, but they have been very carefully selected, and this book may confidently be recommended to British students who wish to extend their acquaintance with examples of geological phenomena.

This edition differs from the first in several respects. The chapter on the work of the atmosphere has been considerably extended, and additions have also been made to most other chapters. In comparison with chapter XIII (on diastrophism), which occupies 48 pages, the treatment of the origin and structure of mountains in 14 pages (chapter XIV) seems rather inadequate.

One other change from the first edition may be noticed: a chapter on earth history which was included in that edition has been omitted from the present,

presumably in order to save space for the fuller treatment of other matters. The reviewer regrets this change, for he considers that an outline of geological history or an introduction to the idea of a time-scale is valuable even in an elementary course. The provision of such a time-scale is probably one of the most important contributions which geology has made to human thought, and it is very desirable that students who do not proceed far in the science should appreciate something of its significance. It also appears to be helpful even for elementary students to understand the relative antiquity of some of the phenomena described in the book. A table giving the main divisions of geological time appears on p. 14, and it may be hoped that in a future edition more frequent reference may be made to this, if it is considered unnecessary to add a short chapter on earth history.

The book has a good index, although the references to "geosynclines" are wrongly given. A. E. T.

CINQUIÈME RAPPORT DE LA COMMISSION POUR L'ÉTUDE DES Terrasses Pliocènes et Pléistocènes, préparé pour le Congrès International de Géographie, Amsterdam 1938. *Paris: Bureau du Secrétaire Général (de l'Union Géographique Internationale)*, 1938. 10×6½ *inches;* 106 *pages; sketch-map*

This report reviews terrace research carried on in England, the U.S.A. and Hawaii, France, Czechoslovakia, and Italy during the period 1934–38.

Although terrace investigation yields important information regarding local crustal disturbances, it must not be forgotten that such studies should ultimately demonstrate or refute the eustatic theory, *i.e.* the existence, in the geologic past, of world-wide changes in mean sea-level due either to deformation of the ocean basins or to the waxing and waning of Pleistocene ice-sheets. The latter type of eustatic change is almost universally admitted, and that problem becomes rather the determination of the exact levels reached, and their chronological order. Such an aim demands, before even the broadest conclusions can be reached, the greatest skill in the detection and morphometric analysis of terraces. For these reasons the most significant contribution to this report is that of Dr. D. W. Johnson, who proposes a joint international investigation of fluvial and marine terrace correlation in relation to the eustatic theory. He advocates the formation of a nucleus of well-trained geomorphologists working independently of each other but in close cooperation with a single directing head, and discusses this project from the financial as well as the scientific side.

Dr. Johnson is very justly sceptical as to the soundness of a large number of terrace reports that have appeared in recent years. The casual use of the term "terrace" to include both form and substance according to convenience, the failure to apply rigid criteria in terrace analysis, and the correlation of gravel dumps and terrace-strips in the most arbitrary fashion, the inconsistencies involved in measuring elevations from an ill-chosen datum are all common, and conclusions are consequently valueless. Even the strictest analysis is beset with difficulties admirably summarized in a recent essay by Austin Miller.[1]

"Terrace studies in the United States," by A. D. Howard, forms the longest and by far the best résumé in the report. There is no lack of precision in describing the exact land forms under discussion, and there are clear and pertinent criticisms of the observers' deductions. The inclusion of pediments is at first sight illogical, there being no general agreement as to their origin.

[1] Austin Miller, "Attainable standards of accuracy in the determination of preglacial sea-levels by physiographic methods," *Journal of Geomorphology*, vol. 2, No. 2, March 1939.

Actually, a new suggestion is that the high-level surfaces in the Rockies, considered by some observers as elevated peneplains, may be pediment remnants, these surfaces having therefore been formed at their present level. Hence the significance of the pediment discussion, which alone would make the report valuable.

The indiscriminate use of the term "terrace" to cover a variety of both land forms and gravel deposits, together with a habit of giving the height of the feature as its average elevation above the main stream, reduced the complexity of the terrace problem in southern England to a startling simplicity. Fortunately, as Dr. Wright's contribution suggests, morphological research is revealing that the geologists' original solution, *e.g.* the Boyn Hill, Taplow, and Flood-plain terraces, was the coarsest approximation. No reference however is made to the important terrace-scheme for the Thames made by Briquet in the fourth report (1934) of this same Commission. His suggestions, although at first sight revolutionary, are both logical and convincing. The challenge must be answered even if, in the process, some cherished illusions risk exposure.

The French contribution is concise and important. However, in spite of the critical attitude of the observers, the rapporteur, A. Briquet, expresses a doubt as to whether the general agreement as to eustatic levels at 6–8 metres, 18–20 metres, 28–30 metres, 55–60 metres, and 90–100 metres may not be in part due to an unconscious bias, following on the popularity of Depéret's values. The paper by Professor Dubois on the form of the basement underlying the Quaternary formations of French maritime Flanders has already been reviewed (*Geogr. J.* 92 (1938) 437).

The Italian essays deal with the evolutional morphology of Italian beaches, and with fluvial and marine terraces in relation to the Pleistocene glacial epoch. Finally, V. J. Novák gives an interesting account of Czechoslovak research; but the interest is, naturally enough, rather for the specialist on that part of Europe.

No morphologist will wish to be without this valuable reference book since, quite apart from the contributions, there are excellent bibliographies. J. H.-L.

WEATHER. By GAYLE PICKWELL. *London: McGraw-Hill*, 1938. 12 × 9 *inches;* x + 170 *pages; illustrations and weather-charts.* 18*s*

This work, written and illustrated with the average individual and the interested student in mind, is characterized chiefly by a handsome series of plates which are mostly photographs of American scenes illustrating the various forms of clouds and effects of particular climatic conditions. Many of the photographs are pure landscapes in which the clouds appear in their natural setting and not as detached elements. Mount Rainier figures several times in these pictures. In one plate entitled "Rain flurries from strato-cumulus clouds" it looks as if the clouds should be designated cumulo-nimbus; it is unusual for showers to fall from strato-cumulus in Europe. Another plate, "Lightning," shows the peculiar camera effect of black branchings from the main luminous ribbon discharge.

It is strange on a plate giving a diagrammatic explanation of the cause of the seasons to find the author committing himself to the illogical and antiquated almanac definition of seasons as beginning on the equinoctial and solstitial dates. Meteorologists are generally agreed that the seasons are best defined by a compromise between the criteria of length of day and thermal lag, so that spring covers the quarter March–May, summer June–August, and so on.

The text is agreeably written and avoids unexplained technical terms, but

theoretical statements are not always quite modern. The blue of the sky, for instance, is not due to the presence of dust particles in the atmosphere which serve to dilute the blue with white, but, as Lord Rayleigh has shown, to simple molecular scattering of sunlight in pure air. L. C. W. B.

TRANSACTIONS OF THE MEETINGS OF THE INTERNATIONAL Commissions of Snow and of Glaciers. Association Internationale d'Hydrologie Scientifique. (U.G.G.I.) Bull. N.23. Sixième Assemblée Générale à Edimbourg 1936. Part II. *Riga*, 1938. 10×7 *inches;* xiv+804 *pages; illustrations and maps*

The International Commission of Snow, which was authorized by the International Association of Scientific Hydrology at Lisbon in 1936, filled a very real need, and the first meeting of the Commission in 1936 was highly successful. Its province has been broadened to include all forms of snow or ice not coming specifically under the heading of glaciers, leaving the Commission of Glaciers, which was in a sense the parent body, to concentrate on the task of measuring the rate of glacial movement. The joint report of the two Commissions covers a very wide field; there are no fewer than seventy-eight papers classified into sections dealing with snow cover, forecasting stream-flow, run-off, lake and river ice, effect on transport, physics of snow and ice, avalanches, glaciers, Arctic and Antarctic snow and ice, expeditions, and apparatus.

Snow is an important source of water supply, but its measurement presents difficulty. On exposed slopes an ordinary rain-gauge is useless unless it is shielded; experiments to this end are summarized in a long paper by C. F. Brooks, while L. T. Guy describes some very interesting investigations in Australia, including wind-tunnel studies of the air currents above unshielded and shielded rain-gauges. Various authors discuss methods of surveying the depth and water equivalent of snow on the ground, while Dr. Gherzi gives the first published collection of data for the snow-covering of China. Mention should also be made of two valuable papers by L. C. W. Bonacina, on "Snow as a form of precipitation and factors controlling distribution over the globe" and "Drift problems suggested by severe snowstorms in the British Isles, with special reference to the permanent Scottish snow-beds"; in the latter he shows that the summit of Ben Nevis only escapes glaciation by a narrow margin.

The importance of snowfields in maintaining the flow of rivers in late spring and early summer leads to the utilization of snow surveys to forecast stream-flow. In North America this attains especial importance where rivers cross the the boundary between Canada and the U.S.A. and the apportionment of water has to be decided in advance; other papers come from Sweden, Newfoundland, Australia, and U.S.S.R. The next sections discuss the effect on run-off of snow and ice in the river itself, and the processes of freezing and break-up of river-ice; most of this work is being done in Europe, and Professor Altberg, of Leningrad, describes "Twenty years of work in the domain of underwater ice formation" with some remarkable illustrations.

Snow is a great hindrance to traffic especially in western U.S.A., where the motor car is ubiquitous, and an elaborate organization has been built up for keeping the highways clear. The four American papers in the section on transport are of great interest and contain some illuminating photographs. The following section on the physics of snow and ice is one of the longest in the report; among the sixteen papers we may refer to a long dissertation on "Mechanical properties of ice," by B. Weinberg, of Leningrad. Other papers deal with the Ice Cave of Dobsina, in Czechoslovakia, and the "Nieve Penitente" of the Chilean Andes. There is a refutation by W. H. Hobbs of F. A.

Cook's claim to the pioneer ascent of Mount McKinley, on the basis of the snow structure shown in Cook's photographs.

Avalanches as an eroding agent in California are described by F. E. Matthes, while the section on glaciers contains reports on the variations of glaciers, among which an intensive study of those of the U.S.S.R. is to be welcomed. The section on the Arctic and Antarctic describes work on the ice-sheets of Greenland and Spitsbergen, while reports are given of the Swedish-Icelandic Vatnajökull Expedition of 1936 and the Oxford University Expedition to North East Land in 1935–36.

These almost random samples must suffice to show the many-sided bearing of snow on human affairs. The debate continues, and for the meetings of the Commissions at Washington this year three main questions have been posed: the permeability of snow by, and its capacity to retain, water; the influence of snow and ice on streams; and the compilation of snow-maps of all countries. The latter project at least will be acclaimed by climatologists and geographers.

C. E. P. B.

CARTOGRAPHY

ATLAS VAN TROPISCH NEDERLAND. Uitgegeven door het Koninklijk Nederlandsch Aardrijkskundig Genootschap in samenwerking met den Topografischen Dienst in Nederlandsch-Indië. *Batavia*, 1938 (*The Hague: Martinus Nijhoff*). $17 \times 13\frac{1}{2}$ *inches;* 31 *sheets.* 16 *gulden*

The idea of a national atlas has now reached a number of countries, including Britain, but this particular example deals with the Dutch Colonial Empire and not the home country. Mercator's projection is used, but the small latitudinal extent of the areas concerned and the fact that all are near the equator lessens its disadvantages. The relief maps are layered and hill-shaded, and while the contour intervals are constant from Java to Sumatra, some may regret the change in shades between these two islands and Borneo, and yet again Celebes. Different layering intervals are used for New Guinea, Celebes, and the lesser more easterly islands.

While the legends on the plates are in Dutch, explanatory notes and translations appear on the backs of the maps in French, German, and English. In addition to the relief, geological, climatic, and biological maps, volcanology and geophysics are represented. Maps show the distribution of volcanoes and of earthquake epicentres, while a number of types of volcano are presented on a scale of 1 : 200,000. The population map is usefully supplemented by a number of examples of settlement types on a scale of 1 : 50,000. Such large-scale inclusions are particularly valuable in an area where the total extent of the region necessitates the frequent use of scales of 1 to 5 or even 10 million.

Each of the islands or groups of islands receives separate treatment. In the case of Sumatra, an economic map shows "centres of production" of the agricultural products together with the trade in individual commodities from the several ports, while on a map of larger scale the actual areal distribution of six of the leading crops is shown for part of eastern Sumatra. In the case of Java, woodlands and irrigation areas are mapped for the whole of the island, and certain areas are presented on a larger scale. The population map of Java has been prepared on a density basis assuming the density to be even throughout each administrative unit, which, in view of the detailed maps of settlement, is disappointing. The plans of six of the larger centres on a scale of 1 : 75,000 provide interesting contrasts, due to location inland or near the coast.

The geological map of the eastern islands honestly confesses, by its generaliza-

tion, its necessary incompleteness, but offers valuable indications of general structural features. The corresponding relief maps are rendered particularly interesting by the inclusion of bathymetric information.

For the Dutch Antilles and Dutch Guiana, relief and geology are shown.

This atlas is the first comprehensive presentation of an equatorial region, and maintains a high standard of execution. H. C. K. H.

ENGINEERING APPLICATIONS OF AERIAL AND TERRESTRIAL Photogrammetry. By Captain B. B. TALLEY. *London: Sir Isaac Pitman and Sons*, 1939. $9\frac{1}{2} \times 6$ *inches;* viii+612 *pages; illustrations and maps.* 32*s* 6*d*

Photogrammetry is a science which forces specialization upon the surveyor, even against his own inclinations. The diversity of methods and the expense of the apparatus effectively prevent intimate knowledge of all branches of the subject. In spite of this, Captain Talley has written a book which adequately covers a wide field and which should be valuable to the practical surveyor. It is moreover refreshing to read a book which gives an objective survey of the science.

Nearly one-third of the space is given to the strictly photographic side of photogrammetry, and this is certainly one of the branches of the subject upon which the author can claim to have detailed knowledge. Makes of cameras from all over the world are comprehensively described. Other chapters deal with flying, the development and printing of film, and the technique of air-photography. It seems surprising that more prominence is not given to the automatic pilot as an aid to good navigation and as a means of reducing tilt. This is all the more extraordinary in an American book since so much of the plotting in the States is done by the radial-line method, which requires well-flown pictures.

One of the main features of the cartographic chapters is a detailed description of the Multiplex as used both for the plotting of verticals and also for the plotting of 45° obliques. The radial-line method, as one would expect, is treated fully, and it would appear that this method is likely to remain a standard way of mapping at small scales in the U.S.A.

Aerial triangulation is described in connection with the Hugershoff Aerocartograph; not, one imagines, a very suitable instrument for the purpose. The author says that in the U.S.A. tests of aerial triangulation have been carried out with several types of equipment of European manufacture, but the results have not confirmed the claims for accuracy made in Europe.

After dealing very thoroughly with methods of plotting from obliques, with the making of mosaics, and with automatic plottingm achines, the author includes an excellent chapter on the uses of photogrammetry. This ought to be read by all our colonial administrators. The examples are mostly taken from the work of the Tennessee Valley Administration, and form a sequence which clearly sets out the practical advantages of the air photograph and of the map that can be made from it.

The geometrical basis of photogrammetry is confined to one chapter. The method of approach is stereotyped and, in the light of modern practice as judged by the remainder of the book, lays stress on the wrong branches of the subject. One can easily imagine a beginner ploughing through the geometry and then, when he has read the rest of the book, wondering what the mathematics has to do with photogrammetry. This is a common fault of many books on the subject. The authors concentrate on the classical perspective geometry of a single picture, which has very little application in these days of stereoscopic measurement. The geometrical basis of correspondence setting, the errors of the radial-line assumption, and the errors of height consequent on the errors of tilt of a pair of pictures are, in this book at any rate, completely omitted. There

is moreover a bad mistake in Fig. 5, in which the axes of rotation of the observing telescope should be shown to pass through the front node of the camera lens.

But the above chapter is the only really weak part of the book, which is a valuable contribution to the (all too little) literature in English on the subject. One cannot recommend the book as a text-book as it does not, for obvious reasons, contain all the working details of all the methods. It is however fully referenced, and original papers can thus be consulted. It should certainly be purchased by every surveyor who thinks that air or ground photogrammetry might solve his problems. E. H. T.

ECONOMIC AND HISTORICAL GEOGRAPHY

CONGRÈS INTERNATIONAL DE LA POPULATION, PARIS, 1937. I. Théorie générale de la population, pp. 270. II. Démographie historique, pp. 104. III, IV, V. Démographie statistique, pp. 154, 148, 248. VI. Démographie de la France d'Outremer, pp. 128. VII. Facteurs et conséquences de l'évolution démographique, pp. 212. VIII. Problèmes qualitatifs de la population, pp. 258. *Paris: Hermann et C^ie^*, 1938. $10 \times 6\frac{1}{2}$ *inches; maps and diagrams*

The proceedings of the Congress, published in eight volumes, and the papers, some of which are of the greatest importance to the geographer, cover almost every aspect of population study; some form of synthesis is badly needed. Volume I, dealing with the general theory of population, includes several papers of a mathematical order concerned especially with the future development of population, optimum population, and the statistical basis of all such study. Volume II comprises eleven papers on the population of certain past empires and some present ones at various periods. A similar number of rather longer papers forms volume III, which includes much material of geographical significance. Equally important is volume IV, in which a variety of migration movements receive attention. Twenty-five papers deal with birth, marriage, and death rates in volume V. Volume VI is devoted exclusively to the French Empire, and VIII to considerations of population that are qualitative rather than quantitative. Volume VII contains several articles of the greatest importance around the theme of the constantly changing distribution of population. The obvious relationship with the more specialized study of migration movements in a previous volume might have been shown effectively if a synthesis had been attempted.

As the scope of population problems is so wide, and their importance so varied, attention may be focused on a few major issues. Mukerji, in an article on "The ecological control of population," points out that among animals there is a wide margin of oscillation around the optimum density; for man, the margin is less wide. The human population, conditioned by social-psychological factors and at times overreaching the optimum density, adjusts itself to the optimum density by an increase in the death rate or a fall in the birth rate. The question of whether the possible optimum is continually increasing arises here: the population of the world doubled between 1650 and 1825, and again from 1880 to 1910, even if the rate of increase has become stabilized during the last fifty years. Generalizations from present conditions may prove as fallacious as those made fifty or a hundred years ago, but there are not wanting those who maintain that in large parts of Europe and the most productive parts of the United States the birth rate is now below the replacement level. According to Woofter, the net reproduction rate of cities in the United States has been insufficient for population maintenance since 1920. The same phenomenon was

noted for Berlin, Hamburg, Stockholm, and Oslo: in the case of the last-named, according to Weith-Knudsen, the population would decline to one-half within a generation in the absence of immigration from other areas. The perpetual ebb and flow of population, apparently the result of an unconscious effort to reach an optimum, may lead to over-population or under-population. Smolenski, in an ingenious article on natural increase and demographic pressure, says that it is not the density of population as such, but the rate at which it increases, that causes over-population. The annual excess of births over deaths, giving a "demographic coefficient," is the vital factor. The countries with high demographic coefficient do not necessarily correspond to the most thickly populated regions; those with the highest are, in order, Egypt, Holland, Japan, Italy, Poland, Germany, Greece, Yugoslavia, Portugal, Great Britain, and Belgium. Of these, the colonial powers do not show marked "population pressure," with the exception of Italy, where the colonies play an insignificant part in the life of the home country. The demographic coefficient which results in over-population can be determined only in relation to the economic structure of a country: it is lower in an agricultural country than in an industrial one and less in western and central Europe than in the Far East, with its lower standard of living. With this in mind, it is suggested that the greatest population pressure is found in Japan, China, Italy, Poland, and Germany.

Of the papers which chronicle current trends, one of the most important is by Dr. Burgdorfer, of Berlin.[1] Through a planned population policy in Germany, the birth-rate has increased by more than 30 per cent., a tendency opposite to that general in western Europe. In Australia and the United States, a stationary population within the relatively near future is postulated and Woofter, in an article on population trends and governmental policy in the United States, suggests that the immigration policy may be reversed when the American people become aware of the social trends which accompany a stationary population. Internal adjustments in the United States during the years of economic crisis, 1930–35, resulted in a gross migration of 6,600,000 and a net migration of 600,000 from the rural to urban areas. There was a movement of 6,000,000 people from the towns to rural areas, either back to their own homes or as "homesteaders," mainly to poor land or previously derelict farms near the cities. This may lead to the creation of miserable agricultural communities similar to those in other parts of the country. There is also an excess of natural increase in the poorer farming areas as compared with the richer. The lowest farm income areas, including the cotton south, the Appalachians, the "cut-over region" of the Lake States, and the drought region, stand out as the areas of greatest fertility. The richer sections, such as New England, and the Pacific coast, show low fertility rates and the towns a reproduction rate below that necessary for maintaining a stationary population. Without an expansion of foreign markets or of urban demand for farm products, any increments in the farm population must largely depend on subsistence farming with little reliance on cash crops. It may be doubted whether increased emigration to the United States would ease the situation; under present conditions the towns, the main attraction for immigrants, cannot welcome new settlers as readily as they have done in the past.

The world-wide problem of the adjustment of rural and urban populations is the underlying *motif* of many of the studies in these Reports. The wider problem of population adjustment to natural resources however remains. The golden harvest of the new lands was reaped in the nineteenth century, and there

[1] See *Ann. Géogr.*, March 1939, pp. 181–4.

are now barriers of all kinds to migration. Mukerji points out that in the south and east of Asia more than half of the human race is now confined to an area which represents only 4 per cent. of the land surface of the earth. There are unquestionably areas which could be opened up if immigration, suitably controlled, were permitted. As Professor D. Faucher has said, "whether migrations, temporary or permanent, are due to economic tension or population pressure (and the two are mutually dependant) or whether they arise from political and social causes, the geographer is always directly interested in their study."[1] The volumes of the Population Congress will prove of great value to all geographers concerned with the study of population. T. W. F.

MIGRATION AND ENVIRONMENT: a study of the physical characteristics of the Japanese immigrants to Hawaii and the effects of environment on their descendants. By H. L. SHAPIRO, with the field assistance of FREDERICK S. HULSE. Issued under the auspices of the University of Hawaii. *London: Oxford University Press*, 1939. $9\frac{1}{2} \times 6$ *inches;* xii + 594 *inches; graphs.* 32*s* 6*d*

In this admirable record of research the author deals with what is probably the most fundamental question in the study of racial types and their geographical distribution: Are the bodily characteristics usually called "racial" as immutable as is generally supposed, or are they subject to radical alteration with a change of environment?

The general conclusions of Boas's pioneering research, carried out three decades ago and, as Professor Shapiro points out, largely neglected since, are here confirmed in regard to a number of measurements, indices, and observations. Three groups of subjects of Japanese stock were examined: first a group of "sedentes," living in Japanese villages from which the Hawaiian migrants came, and in most cases actually related to them; secondly the migrants themselves; and thirdly the offspring of the latter, born and reared in Hawaii. The variation between these groups is striking. For example, "the male immigrants deviate significantly from the sedentes in 72·4 per cent. of the measurements and in 76·2 per cent. of the indices" (p. 188), and when Hawaiian-born males are similarly compared with the sedentes, the corresponding figures are 79·3 per cent. and 90·5 per cent. respectively. In the case of females the variation is less marked, but the same trends are observable.

Professor Shapiro discusses the possible influence of different factors in producing this variation, and eliminates the different Japanese prefectures from which the migrants came, differences of age, and socio-economic status as significant factors in the determination of variation. The differences between the Hawaiian-born and the immigrants are clearly due to environmental influences, but the variation between the immigrants and sedentes Shapiro regards as due to selection, since the former migrated after reaching maturity. The author is cautious in advancing conclusions, and insists upon the need for more data and further analysis.

Such an extension of Shapiro's work is suggested at every point in this patient and thorough piece of research, which opens up a wide range of possibilities in the future of racial studies. Will anthropologists turn from the question of the supposed influence of race on culture to the reverse hypothesis? Will questions of physiology, ecology, and sociology loom larger in the future study of race than cherished anthropometric postulates? What are the quantitative and qualitative limits to the influence of environment on race? And what will be the effect of studies such as this on theories of human evolution and

[1] Faucher, D., *Comptes Rendus du Congrès International du Géographie*, Amsterdam, vol. II, Rapports, p. 83 (Leiden, 1938).

migration? In stressing problems such as these, and in suggesting a more dynamic conception of racial characteristics, Professor Shapiro's work is an outstanding contribution, the significance of which it is difficult to overestimate. R. P.

GENERAL ANTHROPOLOGY. Edited by FRANZ BOAS. *Boston [Mass.] and London: D. C. Heath and Co.*, 1938. 9×6 *inches;* xii+718 *pages; illustrations.* 15*s*

This collection of essays deals with material in physical anthropology, prehistory, and cultural anthropology, the majority being devoted to the last of these. It contains much useful information and covers a wide range of topics, though omitting the most progressive and important branch of present-day anthropology, namely the study of culture contact. The book as a whole is vitiated by the lack of any systematic methodological orientation in the several essays; the discursive and uncritical treatment of original sources is responsible for a number of misleading statements, based upon hasty, superficial, and partial interpretations of the ethnographic material. Thus Dr. Ruth Bunzel's allegation that "property rights among the Maori are based on their theory of personality" (p. 341) applies only to one limited phase of the property rights of chiefs. Professor Lowie's affirmation that "the Australian kept his dog, the dingo, without training it to catch game" (p. 305) is certainly not true of all Australian tribes: it is apparently still necessary to point out that the Australian aborigines are not co-terminous with the Arunta, and that Spencer and Gillen's work is not, by modern standards, an altogether reliable field record. Bunzel's statement about the motives for hoarding in the Trobriand Islands (p. 334) leaves out of account one of the most vital elements in the ideology of Trobriand agriculture, namely the conception of *molu*.

Such inaccuracies as these make the book of doubtful value as a work of reference, though it provides the specialist with several useful leads on important points. As a general introduction to the subject it fails to give more than a very hazy idea of how primitive people live or of the really important aims, methods, and conclusions of modern anthropology. R. P.

ELEMENTS OF POLITICAL GEOGRAPHY. By SAMUEL VAN VALKENBURG. *New York: Prentice-Hall*, 1939. 9½×6 *inches;* xx+402 *pages; maps (by Franklin C. Erickson).* $3.50

Professor Van Valkenburg's object is to provide for English readers an equivalent of the numerous works on political geography published in Germany of recent years. He regards his subject as "the geography of states and a geographical interpretation of international relationships" as distinguished from general geography, where the units are the natural regions. He thus ranges over a wide variety of subjects, including economic geography, ethnographic and population problems, capital investments overseas, and even religion and forms of government. The degree to which geographical considerations enter into these discussions obviously varies considerably. Some readers may feel that much of this material should be taken for granted in a study of political geography, and that attention should be concentrated upon the relation of political units to natural regions, the effects of boundaries upon the areas traversed, the political considerations which have advanced or hindered the development of particular regions, and similar themes. It is however more profitable to indicate the scope of an author's work than to cavil at his definitions. The first section is an interpretation of the political geography of France. This is a general summary which brings out the main points. Then follow a number of chapters

dealing in general with location, relief, boundaries, economic structure and resources, colonies, etc., illustrated by examples drawn from all the continents. As the author realizes, in the case of physical features as boundaries, for example, each case must be considered separately, and no general principles can be established: this section therefore tends to become a list of instances, sometimes of rather obvious significance. Two problems, discussed in some detail, are of topical interest: over-population and colonies. The author demonstrates the difficulty of defining over-population: relation to arable acreage is, in Europe at least, no index. Other natural resources enter into the problem, but at the stage of development which western Europe has reached the population which can be supported by a particular country depends upon a number of world economic factors, and territorial expansion of itself is no remedy for over-population. The chapters on the colonial problem are supplemented by a useful comprehensive table showing the share of colonies in world production. Though in the main this is very small, the author allows that economic considerations are not the sole consideration. What the author describes as the *leitmotif* of his book is his conception of a cycle of political development from youth to old age. Here he concentrates too much on forms of government and on recent political history, and overlooks historical and cultural influences. In many cases national policies have persisted through changes of government, but the main point against his argument, as he admits, is that countries may revert to any stage at any time: in fact, there is no cycle.

Some of his generalizations might be disputed, for example that mountains are "the natural birth-places of political units," and there are several small errors, *e.g.* the foundation of the Congo Free State is dated 1855; Australia is credited with a mandate for British New Guinea; East African troops are referred to as "negro"; on a sketch-map the Meuse is labelled Moselle; and Eyre appears for Eire. These however are minor matters; the book contains a good deal of information, and is liberal in outlook. G. R. C.

GENERAL

WANDERING UNDER SAIL. By ERIC C. HISCOCK. *London: Edward Arnold and Co.*, 1939. 9 × 5½ *inches; 254 pages; illustrations and track-charts.* 12*s* 6*d*

The log of an active member of the Royal Cruising Club is sure to contain some good yarns. Add to that the single-handed character of most of the cruises logged and there are the materials for comedy and thrills. Such a book is Mr. Hiscock's, though it gives us more than these things. It runs the whole gamut of sailing yarns; the experiences of the tyro, a passage in a trading Thames barge, the building of a boat for the author, and the culminating adventure of a single-handed cruise in his diminutive *Wanderer II* from the Solent to Skye and back. Readers who are themselves small-craft cruising men will devour these latter pages eagerly. Courage is not the greatest asset in a sailor, especially in the lone sailor. Imagination is the supreme quality, imagination to foresee every worsening of a situation and to forestall it, to be prepared and equipped for every visitation of fortune. Would-be cruisers should read this book and note how everything is to hand when wanted, and how thereby life is saved.

H. L. P. J.

THE MONTHLY RECORD

PRIZE FOR GEOGRAPHICAL ESSAY

The Council of the Royal Geographical Society offers annually a prize of £10 for an Essay of not more than 5000 words: either a critical survey of recent additions to knowledge in a limited geographical field selected by the writer, which may or may not include field work or research carried out by the candidate, or a discussion of some current problem in its geographical aspects. Competitors for the Prize must be or have been registered Internal or External Students reading for Honours in Geography at one of the Universities of Great Britain and Northern Ireland during the calendar year within which they submit their Essay. Essays must be submitted during the month of December, the award will be made not later than March 31, and the Prize Essay will be published in the *Geographical Journal*. Essays in competition for the seventh award of the prize should be addressed to the Secretary of the Society by 31 December 1939.

ARCHAEOLOGICAL INVESTIGATIONS IN KNUD RASMUSSENS LAND

Professor William Thalbitzer, in his comprehensive and profound discussion of East Greenland antiquities brought back by Amdrup (W. Thalbitzer, *Medd. Grønland*, XXVIII, 1909), included an examination of certain material from the region round Kangerdlugssuaq; Dr. Therkel Mathiassen has described finds from the same locality made in 1932 (Th. Mathiassen, *Medd. Grønland*, CIV, 1934); Larsen, in a brief summer visit to what is now known as Knud Rasmussens Land in 1935 (*Geogr. J.* 88 (1936) 209–13), secured over twice as much material as had been available up to that time, thereby providing himself with grounds for developing the existing theories and conjectures regarding the now extinct culture of the region. Of his account of work in the field (H. Larsen, *Medd. Grønland*, CXIX, 1938), the illustrations and plans in the text, and the methodical tabular presentation of material results nothing need be said but that they maintain the tradition which produced Dødemandsbugten.

In the examination of his own results in comparison with those put forward by Mathiassen, who was using both the Amdrup and the 1932 material, he finds no differences in as far as his material can be compared with the previous collections, but he has further data available which extend the scope of the obtainable horizon. Mathiassen was able to assert that the occupation of Kangerdlugssuaq originated from a northerly expansion from Angmagssalik at about A.D. 1500, and perished in the eighteenth century: this he deduced from having as evidence 48 Inugsuk or early Angmagssalik types, 3 late Angmagssalik types, and 4 locally derived ones. Larsen's material ranged with these previous specimens gives 80 Inugsuk or early Angmagssalik types, 9 late Angmagssalik types, 10 locally derived types, and 5 derived from West Greenland at a period of from A.D. 1500 to 1650. There is thus no reason to alter Mathiassen's estimated time of origin for the culture, as the predominance of Inugsuk or early Angmagssalik types makes it certain that it was during a period round the turn of the sixteenth century. But the small changes in the type-representation, coupled with the very characteristic house-shapes which indicate a derivation from the eighteenth-century type revolution, demand an explanation. This Larsen provides by emphasizing the continual and important intercourse, that was not in any sense an expansion or migration, between the peoples of Kangerdlugssuaq and those of Angmagssalik, which led to the one important acquisition—the

house-shape—but through which the culture as a whole remained remarkably conservative. This suggestion, coupled with the discovery of a definitely nineteenth-century type of edge mounting in one of the houses, leads him to deduce that the extinction of the colony did not take place until well into the nineteenth century. As Mathiassen at Angmagssalik, so Larsen at Kangerdlugssuaq imputes the high situations of the houses to strategic rather than topographical necessity, owing to the blood feuds which prevailed. The analysis of the work is as pleasant and exact as the practical side, the whole giving rise to the conviction that nothing remains to be said. R. W. F.

THE SOLITARY OR DRY TREE OF MARCO POLO

Among the minor problems suggested by the Venetian traveller's book, one of the most intriguing perhaps is his supposed references to the medieval legends of the Solitary or Dry Tree (*Albero solo* or *secco*) which he localizes in northern Persia. It has been discussed at length by some of the commentators, particularly by Yule and Cordier—by the latter in his edition of Friar Odoric, who also refers to the tree. Both identify the tree with the Oriental Plane, but there are still unsolved difficulties in the way of acceptance of any actual tree as intended in all Polo's references. A renewed attempt at a solution has now been made by Sig. S. Franchi, of Tehran, in an article printed in the *Atti* of the Turin Academy of Sciences (vol. 74, 1938–39), a reprint of which has been sent us by the author. The puzzle has been that any single tree should have been thought of such importance as to define the position of an extensive province or region, the name of which is read as either Temocam or Tunocain, the latter being adopted by Yule and most commentators, as representing the combination of two place-names in south-east Khurasan. Sig. Franchi prefers the other, which he identifies with the province of Damghan, and which certainly fits in well with Polo's statements, both with reference to the current belief that a battle took place there between Alexander and Darius (the latter was in fact murdered in that district) and to the strongholds of the Assassins (Alamut) as associated with it. These had lately come into prominence from the energetic measures against the Ismailite rulers taken by the Mongol Hulagu. Damghan also fits in with Polo's description of it as reached after the traverse of the great Salt Desert. Apart from Polo's use of the tree to define an actual region, there are references to it of a more fantastic nature, evidently based on the various current legends. Sig. Franchi thinks however that Polo is not to be saddled with these, but that they are embroideries added by copyists who misread or misinterpreted his words; for he was usually most careful to distinguish what he derived from hearsay only, and there is no such caution in regard to the fables of the Solitary Tree. He holds that it is the Elburz range which is intended when it is a question of topography, for it does rise out of an extensive fertile plain, while its widely different north and south versants—the former forest-clad—would be the basis of the supposed difference between the leaves on the two sides of the tree. In Italian the name Elburz Kuh might well become Albors Cu or Co, from which the transition to Albor So(lo) or Sco (secco) would be easy. There seems much to be said for this view, though in fact it is not entirely new, for it was thrown out (as a mere suggestion) nearly a century ago by the Italian editor Lazari—a fact which seems to have escaped Sig. Franchi's notice. He has for the first time however elaborated the points in its favour, for both Yule and Cordier (in their editions of Friar Odoric) dismissed it with a few words only. It certainly seems to deserve the attention of commentators, and it may be noted in its support that Yule himself was disposed to localize the tree in the neighbourhood of Damghan. E. H.

NEW ENGLAND HURRICANE OF SEPTEMBER 1938

On 21 September 1938 New England was swept by a hurricane of special severity the like of which in that region only occurs about once in a century and a half. Professor C. F. Brooks, Director of the Blue Hill Observatory, Harvard University, gives a general account of the meteorology of the storm in the *Geographical Review* for January 1939. The disturbance appears to have originated in the tropical Atlantic between Puerto Rico and the Cape Verde Islands, and to have travelled in a north-westerly direction till caught in a southerly current of air on the western margin of an anticyclone which carried it north to Long Island and New England. The system was a whirling circular storm with a diameter of about 200 miles. The general velocity of the wind was 80 miles an hour along the exposed coast and 60 miles an hour inland, but a characteristic of the storm was the development of numerous localized eddy-like gusts of great violence in which the speed was commonly between 100 and 120 or more miles per hour. On Mount Washington a speed of 163 miles per hour was recorded, and at Blue Hill the anemometer registered 186 miles per hour, with however a wide margin of uncertainty either way. The sea rose to such heights that demolition was general along the coasts, where hundreds of people were engulfed and drowned. Flying sea-spray encrusted windows and killed vegetation 20 miles inland, traces of salt being found even 50 miles away from the sea. The gale snapped or uprooted millions of trees, damaged or destroyed thousands of buildings, and put out of action nearly 20,000 miles of electric power and telephone lines. The loss of human life is placed at 682, and though this number of deaths has been exceeded in a few other hurricanes, the damage to property is described as greater than in any other single storm which has occurred anywhere in the world. The hurricane brought heavy rainfall (over 6 inches) in a belt of country stretching from central Connecticut to New Hampshire, which was in marked contrast with the light rainfall of Rhode Island and eastern Massachusetts. Inland, many rivers already flooded by four days of heavy rain added to the destruction.

Mr. H. F. Lambart, of Ottawa, has sent to the Society cuttings from New York newspapers on the hurricane, at the same time drawing attention to Professor Brooks's article, and enclosing a letter from Mr. Howard Palmer, of Westerly, R.I., describing personal experiences when out in the storm. It was difficult, he says, to breathe or stand up, and though there was little rain the air was filled with a salt fog from the ocean, coating with salt buildings many miles inland.

FORMER DISTRIBUTION OF AUSTRALIAN ABORIGINAL TRIBES

In a carefully considered study of the aboriginal population of Australia prior to 1788, D. Sutherland Davidson has made the first attempt since that of Curr in 1887 to show the distribution of the tribes ("An ethnic map of Australia," *Proc. Amer. phil. Soc.* 79 (1938) 649–79). In a text-figure he shows the presumed density of population before the arrival of the Europeans, and on his map he has made a critical distribution of the names of all the recognized tribal groups. The work has settled questions of synonymy not considered by Thorpe (*Rec. Aust. Mus.* 8 (1910–13) 161–92). So meagre is existing knowledge of tribal geography that the boundaries of tribal areas are shown only in Arnhem Land, northern New South Wales, and parts of Victoria, but there is a certain amount of information about the coastal tribes of Queensland, gathered by Roth and Petrie, which might have been included. Davidson points out that the horde, a unit of about five families, in all some thirty-five persons, was the largest political unit known to the Australians, an unprecedented political con-

dition in any society. Before 1788 there were between 7000 and 8600 hordes in Australia. The tribes, though recognized by the aborigines themselves, had no political cohesion, their unity being cultural or linguistic. The average tribe consisted of about ten hordes. Davidson considers that population had been rigorously adjusted to the available natural resources of the tribal areas perhaps for centuries, mainly by deliberate infanticide in times of dearth, and by natural increase in times of plenty. He considers that displacement from tribal territory was rare before the arrival of the whites, but brings forward some interesting evidence to show that inland tribes have moved out into districts from which pastoral enterprise has withdrawn during the last three or four decades. His tribal map, though provisional in character, is perhaps the most important contribution to the geographical study of aboriginal society in Australia yet put on record. It is not quite up to date in the spelling of the names—Arunta for instance now being written Aranda in Australia; but it is fuller and more critical than anything else available, and, being drawn on a scale of about 124 miles to an inch, is large enough to meet many of the needs of detailed research. M. A.

THE PEAK OF TRISTAN

We have learnt from Mr. Allan Crawford, who accompanied the Norwegian scientific expedition to Tristan da Cunha in 1938, that Dr. Christopherson, the leader, was proposing to request the permission of the Colonial Office to name the central peak of the island Mount Olav after the Crown Prince of Norway, and that this name has appeared on sketch-maps illustrating the expedition's work. We are informed by the Colonial Office however that no such request has been received, and that they consider that, as this feature is known by the islanders and by seamen as The Peak, the name should be retained, although it does not appear on the present Admiralty chart of the island. The Peak of Tristan bears some resemblance to The Peak of Tenerife, which has been so called for a considerable period, and there seems no reason why this feature in Tristan should not be similarly named.

THE RADIATION THEORY AND THE GEOLOGICAL PERIODS

Under the title of "Die Strahlungstheorie und die geologische Zeitrechnung" (*Z. Ges. Erdk. Berl.* Heft 9/10, 1938) A. Penck discusses the bearing of variations of the amount and distribution of incoming solar radiation on geological estimates of time, and the effects of variations in the orbit of the earth about the sun and in the earth's aspect to the sun. In the whole of the discussion, the sun's output of radiative energy is regarded as constant. The possibility of explaining geological changes of climate was first discussed on this basis in 1830 by John Herschel, who showed that the amount of radiation which the earth receives from the sun is inversely proportional to the minor axis of the earth's orbit, and so increases slightly with the eccentricity of the orbit. But a more important effect of the eccentricity is that it affects the duration of the seasons. The difference between the length of summer and winter, which at the present time is 7 days 14 hours, can in favourable conditions amount to as much as 31 days 20 hours, so yielding a long summer and short winter in one hemisphere, and a short summer and long winter in the other. The conditions will be reversed in 10,500 years. This interval of time is too short to afford an explanation of the ice ages. Croll's explanation of the ice ages rested not on the smaller radiative gain in winter, but on the effect of the long winter in bringing cold winds and in altering the ocean currents. The theory demands that an ice age in one hemisphere should be contemporary with an inter-glacial

age in the other hemisphere, and such an arrangement is apparently not borne out by the facts.

Most of Penck's paper is devoted to a discussion of the theory of Milankovitch, who has developed formulae for the computation of the radiative income in different latitudes for variations of the inclination of the ecliptic, of the eccentricity, and of the longitude of perihelion. The results are given in "canonical units," which are converted into calories per square centimetre when the numbers are multiplied by 5·26. Milankovitch also gives a means of converting the radiative changes into temperature changes. Changes in the eccentricity, or in the longitude of perihelion, alter the annual variation of temperature, but not the yearly mean temperature; while changes in the inclination of the ecliptic, having a period of 40,000 years, can produce changes in the annual amount of radiation, and so affect the annual mean temperature.

Penck adduces strong arguments to show that ice ages can only be explained by the occurrence of cold years, cold winters and warm summers being insufficient. He rejects therefore the possibility of explaining the ice ages by variations in the eccentricity or in the longitude of perihelion, on grounds which appear to the reviewer to be incontrovertible. While the periodicity of the inclination of the ecliptic is in itself suggestive, Penck points out that its effect is appreciable in high latitudes, but falls to zero in latitude 45°. But marked glacial effects are to be observed in latitudes around 40°, both in the Alps and in New Zealand. This appears to rule out the variations of the inclination of the ecliptic as the primary cause of ice ages, though some of the computations of Milankovitch indicate that in high latitudes there have been times when the inclination of the ecliptic has favoured the occurrence of cold summers and cold winters, *i.e.* of cold years. Milankovitch expressly cites as noteworthy that at the time at which he places the Würm glacial epoch the year as a whole was cold, though, as stated above, this is only true for latitudes above 45°.

The whole subject discussed by Penck bristles with difficulties. Even if we accept the computations of temperature distribution over the globe given by Milankovitch for different epochs of geological time, we cannot from these deduce directly the persistence or non-persistence of snow throughout the year. The total winter snow accumulation is determined by the amount of precipitation and by the temperature. The total melting in summer is determined by the total time during which the temperature is above 0°, the actual temperature during the period of melting, the occurrence of warm winds, and the fall of warm rain. None of these factors can be assessed simply in terms of the temperature.

Penck brings out the difficulties of obtaining a clear estimate of the geological time-scale in terms of the variations in radiation produced by the changes in the earth's orbit. There are still further difficulties. The energy which the earth receives from the sun as radiation is on balance sent out into space as long-wave radiation at the same rate at which it is received. This is only true for the earth as a whole, and is not true for any individual zone of latitude. The winds of the globe take an active part in the transport of heat from low to high latitudes. Any change in the general latitude variation of temperature over the earth's surface would lead to a variation in the wind circulation, and this would in turn lead to a variation in the cloud amount and in precipitation. There is no simple method of estimating the magnitude of the effects of these variations, and until this is done no satisfactory theory of the variations of climate in geological times is likely to be developed. If, in addition to the factors considered by Penck, we also take into account the possible variations in the rate of output of radiation by the sun, the theoretical treatment of the problem becomes almost impossibly complex. D. B.

GEOLOGY OF THE SEAS

Geologie der Meere und Binnengewässer (Bd. I, Heft I, 1–176. Berlin, 1938. *M.*19.20) is the first number of a new periodical dealing with the geology of the seas. Many sciences—marine biology, oceanography, marine engineering, geology, and geography—contribute to our knowledge of what is happening in the seas, which now cover four-fifths of the surface of the earth. Much of this knowledge is essential for the geologist if he is to interpret the past in the light of the present, for many of the rocks of the continents were formed in seas which have now vanished. This field has not however so far been the particular province of any journal; the gap is now filled, and the names of the scientists from many lands who are cooperating with Erich Wasmund, the editor, should inspire confidence that the field will be covered adequately.

This first number includes articles on a variety of topics: heavy minerals in the dune sands of Heligoland, types of weathering on tropical coasts, submarine topography off the coast east of Heligoland, alterations in Javanese deltas, and the post-glacial evolution of the North Åland Sea. There are two useful reviews of the literature on special topics: the natural concentration of heavy minerals around coasts, and the significance of bacteria in relation to calcareous deposits. There is also a valuable list of the literature (since 1930) concerned with the marine geology of the North Sea. Finally, there are reviews and news items. The whole publication is well planned. Unlike many journals it covers a definite field and covers it effectively. One hopes that publication in this country of the results of geological research will in time become more systematic; much time and expense will then be saved. Meanwhile we may be grateful for this example from another country. R. M. S.

A NEW QUARTZ GRAVIMETER

G. Nørgaard, in "Ein statischer Quarzschweremesser und Schweremessungen" (Danish Geodetic Institute. *Medd.* 10, 1939), describes a new quartz gravimeter in which two identical quartz fibres are supported at their bases and extend almost vertically upwards, bending slightly towards each other under the influence of gravity. The separation of the two upper extremities of these fibres is a measure of the acceleration of gravity. By constructing the instrument in this way the measurements are not upset by a small tilt of the apparatus, although to make two fibres sufficiently identical would not be an easy matter. In order to provide damping and temperature compensation, and to prevent the accumulation of electrical charges, the system is immersed in water.

A large number of measurements are included, and also a map of an area of about 500 square miles in Denmark, on which are shown some gravity anomalies which have been determined with this instrument. It is claimed that two men with a motor car can visit as many as twenty-five stations per day, and that with four separate measurements at one station the value of gravity can be determined with a standard error of four parts in ten million. Frequent standardizing at a central station is recommended. A. E. B.

PHOTOGRAMMETRIC SURVEY IN NORWAY

We have recently received from the Norwegian Survey Department an account of the work carried out last year ('Beretning om Norges Geografiske Oppmalings Virksomhet i Aaret 1938'). This report contains an interesting note on the costs of an aerial photogrammetric survey in Finnmark which was completed last year. Vertical photographs were used, and the control points for plotting were determined partly by triangulation and partly by plane-table. The scale of the survey was 1 : 25,000. The calculation of the expenses was made

with care, and included such items as the deterioration of the cameras and of the expensive Zeiss Stereo-planigraph which was used for plotting. It was found that the total cost was even then less than 40 per cent. of that which would have been incurred by other methods. It is not often that a government department publishes a definite statement about costs, and this note is all the more interesting for that reason; it is a pity however that more details of the expenditure are not given. In view of the recent discussions in England about photogrammetric methods, it may be worth noting that the country covered by this survey was of comparatively low relief (200–400 metres), but on the other hand it was thinly populated and almost entirely lacking in roads. In addition its high latitude (just south of 70° N.) would presumably make work possible during only a small portion of the year. J. W. W.

OBITUARY

SIR REGINALD TOWER, K.C.M.G., C.V.O.

Reginald Thomas Tower was born in 1860, and educated at Harrow and Trinity College, Cambridge. He entered the Diplomatic Service in 1885 and was sent to Constantinople, where he remained for seven years. He was then transferred to Madrid, and later to Copenhagen and Berlin, before being moved to Washington in 1898, where he was concerned in the reciprocity treaty between the U.S.A. and the West Indies. In 1900 he went to Peking as Counsellor, and carried out numerous reforms in the Consular Department of China. Subsequently he became Minister in Bangkok until 1903. In 1906 Tower was sent as Minister to Mexico during the rule of Porfirio Diaz, with whom he was soon on terms of great friendship; their collaboration marked the last period of prosperity in Mexico. After the fall of Diaz, Tower was transferred as Minister to Argentina and Paraguay. His departure from Buenos Aires in 1919 was marked by a wonderful display of respect and affection from the British Colony in Argentina and Paraguay.

Tower had long desired to be returned to Mexico, but instead he was appointed in 1919 as High Commissioner of the shortly-to-be-constituted Free City of Danzig. On his arrival in Danzig early in 1920, the general situation somewhat resembled that of the present moment. Orders, often contradictory, were issued to Tower by numerous bodies, British and French. Moreover, although the Allied army of occupation was composed of but one battalion of British and one of French infantry, the latter under direct orders of Paris only, a bloated corps staff functioned in the city. It was ostensibly watching developments in Moscow, but occupied itself with local politics to the detriment of Tower's administration. Despite these troubles Tower's imperturbable good sense, equity, and sense of humour kept the peace until the disaster of Kiev in July brought the Soviet Army to the very gates of the territory of Danzig. Arms were hurried out by sea to Neufahrwasser; a French cruiser crammed with scrap iron from the battlefields of France duly arrived with orders that the "weapons" be disembarked by Danzig dockers for the struggling Polish Army. A general strike of all Danzig workmen followed. Orders arrived from London that all the weapons be handed over to Poland

forthwith, but that British and French troops were not to be employed. With no other man-power available, Tower called for British volunteers; the excellent 3rd Battalion Royal Fusiliers responded to a man, and, amidst general amusement, the rusty heaps of old iron were landed and despatched to Poland. Meanwhile the battle of the Vistula had been won and the Soviet Army was in full flight. Reginald Tower had by now proceeded to Paris in an attempt to find solutions for a situation that was perhaps insoluble. He never returned, leaving his next in authority to proclaim the freedom of the City of Danzig under the League of Nations in November 1920. But so long as Danzig remains a Free City, Tower's name will be respected by its officials and population. He thoroughly understood their difficulties, and the fact was apparent to every man and woman of the Free City.

Tower retired in November 1920 and lived henceforth at his home near Canterbury, where he devoted himself with great enthusiasm to local affairs besides his archaeological and botanical interests. To those who were privileged to be his friends, Tower will remain a great personality. A scholar and an excellent linguist, he was the ideal diplomat and gentleman. Cultured, humorous, and charming in manner, he could nevertheless express himself forcibly and fearlessly when the occasion arose. A very keen geographer—an interest acquired doubtless during his numerous travels—he had been a Fellow since 1902 and served on the Council of the Society from 1923 to 1925. E. L. S.

MISS ELLA SYKES

When the Council of the Society decided to admit ladies to their Fellowship, Miss Ella Sykes was one of the first to join, and the Society had no keener Fellow. With good health, courage, and resourcefulness, she was fortunate in having in Sir Percy Sykes a brother who could take her to Persia and Central Asia. In 1894, travelling across the Caspian Sea, she accompanied him to Tehran. She then rode to Kerman, where he founded the British Consulate in 1895. In the following winter she accompanied him to the Perso-Baluch boundary, where they joined the Boundary Commission under Colonel Sir Thomas Holdich. Upon the completion of the work of the Boundary Commission in February 1896, she rode across the deserts of British Baluchistan to Quetta, thus being the first lady to ride from the Caspian Sea to India, a journey which is described in 'Through Persia on a side-saddle.'

In 1915 she accompanied her brother *via* Norway, Sweden, and Finland to Moscow. Thence they journeyed to Kashgar through Orenburg, and passed along the shores of the Aral Sea to Tashkent. Railhead was reached at Andijan, and a carriage took them to Osh. From this little town they crossed the Tian Shan with great difficulty owing to the melting snow, and finally reached Kashgar. They crossed the Pamirs by the Katta Dawan pass, which she was the first lady to negotiate, in a snowstorm. In the autumn a second journey was undertaken to Yarkand and Khotan. This expedition resulted in a joint work, 'Through deserts and oases of Central Asia.'

Miss Ella Sykes was keenly interested in all she saw, the more so since she combined a love of history with her love of travel, and was able to appreciate to the full her good fortune in seeing lands so full of interest. Buildings, carpets and rugs, tiles, silk, and pottery all delighted her, but it was the people, their outlook and ways of life that she best understood. Those who knew her best found her full of understanding, of courage, strength of mind, and common sense, a strong and upright character.

LIEUT.-COLONEL T. T. BEHRENS

His many friends in our Society will have learned with deep regret of the death, on 16 April 1939, of Lieut.-Colonel T. T. Behrens, of Rusthall Elms, Tunbridge Wells. He was commissioned in the Royal Engineers in June 1897. In 1902–04 he was employed as Assistant-Commissioner, under Colonel Delmé Radcliffe, on the delimitation of the boundary between Uganda and German East Africa, through 150 miles of rather difficult country to the west of Lake Victoria, and in 1904–06 under Colonel G. E. Smith upon another section of that boundary for 350 miles from the southern end of Jipé to Lake Victoria. From his experience on this service he contributed two papers to the Society: "The snow peaks of Ruwenzori" (*Geogr. J.* 28 (1906) 43–50) and "The most reliable values of the heights of the Central African lakes and mountains" (*Geogr. J.* 29 (1907) 307–329), with a "Note of 40 photographs taken during the Anglo-German Boundary Survey in East Africa," which he presented to the Society (*Geogr. J.* 28 (1906) 208). Later he was one of the officers of the Geographical Section of the General Staff, and whilst so employed accompanied the chief of the Section to Berlin, to take part in discussions on the eastern frontiers of the Congo State. During the war he served with various Royal Engineer units on the Western Front. After the war he was appointed British Commissioner on the Commission for the delimitation of the Italo–Austrian boundary, which included the Brenner pass. This duty was admirably carried out. In the Society's Museum we have a model of the boundary pillar, set up at that pass, on which is inscribed in Latin the legend: "Thus far, O Rome, is thy voice heard." In 1922 he translated the treatise on 'National Frontiers in relation to International Law,' which Colonel Vittorio Adami, of the Historical Section of the General Staff at Rome, had published in 1919. This important contribution to the literature of the subject in English Colonel Behrens had printed for his own use during the work of the International Commission, and it was afterwards put on sale by the Oxford University Press.

For some years Colonel Behrens had been re-employed as Garrison Engineer at Shorncliffe, where the problems which arose in the course of his duties led him to take an active interest in coast erosion, especially at Dungeness. He began last winter to study a fine series of air photographs which he had secured, borrowing from our Society a Zeiss field-stereoscope for this purpose, and this material is now in the hands of Mr. W. V. Lewis at Cambridge. His last contribution to the Society was a brief note which he sent for the discussion on Coastal Changes at the Society's Afternoon Meeting in February last.

Those who knew Colonel Behrens will deplore the loss of a capable, friendly man, whose straightforward character enabled him to deal successfully with all sorts and conditions of men, and whose exceptional knowledge of frontier delimitation and demarcation was of real service to the State. C. F. A.-C.

DR. L. H. DUDLEY BUXTON

Dr. Dudley Buxton died at his home in Oxford on March 5 of pneumonia following influenza, within thirty-six hours of the death of his wife from the same cause. He was forty-nine years of age.

The son of a well-known London doctor, Dr. Buxton was a scholar of Radley and Exeter College, Oxford, where he gained honours in classics and distinction in the diploma of Anthropology. Before the war he was engaged on anthropological field work in the Sudan; and from 1914 to 1918 he served in France, first with the Cameron Highlanders and later in the Intelligence

Branch. In 1921 he was elected to an Albert Kahn Travelling Fellowship, which he utilized by travelling round the world. He spent a profitable period in the interior of China, and in 1923 read to the Society a paper entitled "Present conditions in Inner Mongolia" (*Geogr. J.* 61 (1923) 393–413).

Many tributes have been paid to the great range of Dudley Buxton's interests in every branch of university life. Though Bursar, Dean, and Tutor of Exeter College, Reader in Physical Anthropology, Curator of the University Parks, and a City Councillor, he found time to be a keen supporter of the new Honour School of Geography in Oxford, in which he was an honorary lecturer and member of the staff. At the time of his death he was Chairman of the Faculty of Anthropology and Geography. He had been a Fellow of our Society since 1920. In addition to the paper mentioned above he regularly contributed to the reviews, the last of which, written shortly before his death, was published in the *Journal* for May. K. M.

MEETINGS: SESSION 1938–39

Seventh Afternoon Meeting, 15 May 1939. The President in the Chair

Paper: Echo-sounding of British lakes. By Dr. E. B. Worthington

Fourteenth Evening Meeting, 22 May 1939. The President in the Chair

Elections: Reverend William Bowman; Alastair Guy Spens Campbell; Captain Robert James Finch, Jnr.; Louis Franklin Freed, M.B., CH.B.; Miss Kathleen Elisabeth Lloyd; Miss Margaret Lindsay Tillotson

Paper: Agricultural colonization in the Pontine Marshes and Libya. By Sir John Russell

Fifteenth Evening Meeting, 12 June 1939. The President in the Chair

Elections: David Browning; Reverend Sidney Arthur Burnham; Jal Manekji Cooper; Tom Haslam; Michael Hay, M.A.; S. A. J. Howieson; Horace Arthur Marsden-Law; Austin Bruce McGee; Albert Edward Poole; John Cyril Taylor Rains, B.C.L., M.A.; Bernard Ockert Schonegevel, J.P.; Mrs. Vivien Enid Schonegevel; P. A. Williams

Paper: The road to Chephren's quarries in the Libyan desert. By Mr. G. W. Murray